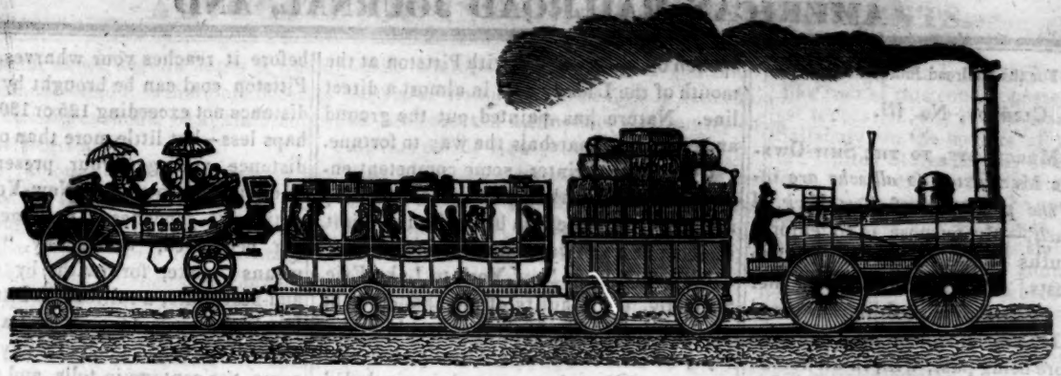

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, EDITOR.] SATURDAY, APRIL 16, 1836. [VOLUME V.—No. 15.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, APRIL 16, 1836.

☞ In consequence of an accident, by which EIGHT pages of this number of the Journal was thrown into PI, or broken down, and had to be entirely set up again, our advertisements are omitted this week.

ERRATA.—The *last* number, or 14, dated April 9th, appears, by a *battered* type, No. 11.

☞ In consequence of the *delay* of the Journal, after the fire, the numbers have been, since that time, *generally* issued about *four* weeks later than the date on them. This *unavoidable* delay, on my part, has been a source of much inconvenience and disappointment to some of our readers, and of course, of deep regret to us—and therefore, in order to obviate the difficulty as soon as possible, we have endeavored to print *two* numbers a week, in order to remove the cause of the complaint—and as we are now within *two* weeks of the regular date, we hope soon to be able to say that we are, at least, "*even* with the world."

NEW-YORK AND ERIE RAILROAD.—It is with most sincere pleasure that we record the final passage through the Senate, and approval by the Governor, of the bill to expedite the construction of this road.

Our legislature has proved to us that the best interests of the people at large are still consulted, in spite of all the noisy bullying and artful sophistry got up on this occasion. No public work has ever been projected, leading to more splendid results. The North and the South, East and West, city and country, will all share in common, its benefits.

Now, gentlemen of the New-York and Erie Railroad Co., the State has, at length, in part done its duty to the inhabitants of the Southern counties, and if you are the men we have always taken you for, you will show them such a work as has never yet been seen, either for solidity of structure, rapidity of transit, or utility of purpose; and, what is still more important, executed with a promptness that shall disappoint its friends, and shame its enemies. The aid of the State is now pledged, and you *should*, as we are sure you *will*, complete your road as rapidly as your enterprise may dictate, and the nature of the case will admit. Your reward is before you. How can we better close our advice than in that homely but expressive phrase, "Go ahead."

We do most heartily congratulate the public upon this event, so important to our city and to the whole State, and venture to predict that in less than five years, the noblest Railroad in the world will be in successful operation.

Since the above was written, we learn, as will be perceived by the following notice, that the directors have resolved to offer immediately *one hundred and eight* miles for, addition to the *forty* now under, contract. This looks indeed as though the Company had adopted our motto—"Go ahead."

We have seen the model of a Dry Dock, by J. W. Holly, as exhibited at the Exchange for several days. The principle of its operation is very simple. A chamber closed by lock gates is to admit the vessel; water is to be thrown in until it can be floated into a basin, the bottom of which can be kept dry, when the gates are closed. The vessel is to be properly supported, and the water let out as usual.

This form of a dry dock would be most economical and expeditious in its operations, where a stream of water could be had to supply the basin, and in most cases this could be accomplished with ease.

The inventor proposes to throw water into the basin by means of a steam engine, when the natural advantages of a stream cannot be obtained.

The great simplicity and trifling cost are prominent advantages in this dry dock

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For the Railroad Journal.

Clinton, No. III.

To the Merchants, to the Ship-Owners, to the Mechanics, *to all who are interested in the prosperity of New-York, I address myself.*—My purpose is to enforce salutary truths of the highest moment to your interests. Pennsylvania, under her new order of things, is pushing her canal through to Lake Erie. The present summer, and one more being past, will, in all human probability, see canal boats passing from that Lake to the western division of her great canal. New-York, from her position, is practically cut off from the immense trade of the Ohio. True, by the grand canal and the Lake, she can throw in, through the Ohio canals, late supplies of goods, while your active rivals of Philadelphia and Baltimore work wide awake—both up and doing—are in the full supply of the market three weeks before you. If this cannot be wholly, it can be partially, remedied. But the western country is, from its vastness, a world of itself, and while the trade on the Ohio will be immense, who can measure the business, the demand for goods, the abundant returns in every thing that constitutes the element of mercantile business and profit of their inland seas, Lakes Erie, Huron, Michigan, Superior, and onward, nearly equalling in extent and fertility the Mediterranean and its tributaries?

The great and growing trade of this extensive region it is in your power, if not to monopolize, at least to secure a large proportion of, by prompt and energetic action. I mean, by a railroad in the most direct line practicable from your city to Lake Erie. Every mile saved is important, every hour gained is worthy of consideration. The Tioga branch of the Susquehanna, from Bath, by Painted Post, and Newtown, cuts the State line of Pennsylvania, a few miles above Tioga Point, where it meets that river, and descends in its main direction to Pittston in Luzerne County, not considering its sinuosities, but taking its general course in almost a direct line to New-York. Indeed, this point is of so great importance to your interest, that all your intelligent men, your enterprising young men especially, ought to make themselves fully masters of the subject. Instead of inquiring, "What news from Washington? Has the expunging resolution passed? Have Wise and Bynum kissed and made friends?" the exciting question should be, "By what route can we reach Lake Erie by railroad to most advantage? Have you examined the map? Have you measured the air-line distance? Do the waters of the Susquehanna, for near a hundred miles, cut through the ranges of mountains, and open an easy way to form a railroad from the Lake to our city?" Put a thread, one end at New-York, and the other on the Lake, so as to touch Buffalo, and behold! the valley of the upper Susquehanna spoken of, will be found with Pittston at the mouth of the Lackawana, in almost a direct line. Nature has painted out the ground and enterprize marshals the way to fortune.

I wish, Mr. Printer, some competent engineer,* would make an estimate, as nearly as can be, from the data before him of—first, the cost of a railway, on the nearest practicable route, from New-York to Lake Erie. Secondly, the quantity of merchandize and produce (excluding coal) that would probably pass on the road. Thirdly, the cost, per ton, toll and transportation included, per mile. Fourthly, the time cars, with lighter kinds of merchandize, dry goods, &c., and passengers, might pass from the city of New-York to Buffalo. And fifthly, the probable extent of the canal trade, both ways, from Pittston—*i. e.* from Pittston to New-York, and from Pittston to Buffalo and the intermediate country.

Let the fact make its due impression. Let it be talked of in every intelligent circle; let it be borne constantly in mind, that the rich and inexhaustible coal mines of purest anthracite, at Pittston, Luzerne County, are on an air line, only one hundred and six miles from the city of New-York! Do you doubt it? Do you say it is impossible? I reply, go take your map; put one point of your dividers on New-York and extend the other to Pittston at the mouth of the Lackawana, in Luzerne County, (directly in a line to Buffalo, too,) and now measure the distance on the scale--see! it is only one hundred and six miles!—as true as you live: and that very soon—the sooner the better for us all—there will not only be a railroad from the city to those coal mines in Pittston, but we shall see cars laden with coal come from those mines and unload their burdens at our wharves the same day, while passenger cars will in all probability go and return in a day.

I wish this matter would be duly appreciated. The coal trade is yet in its infancy; thus far the demand has outrun the supply. What the value of coal has been in New-York the past winter you can best tell—I presume from seven to nine dollars a ton. A necessary of life, indispensable to existence as bread, the demand will go on augmenting with increasing population, all along the sea-board; and from the fact stated of the nearness of the Pittston coal fields, it is apparent that New-York may share largely with Philadelphia the new and increasing business resulting from the coal trade. It should be borne in mind that now a large, if not the principal, supply of coal comes from Schuylkill County, and is transported more that two hundred miles before it reaches your wharves,* while the Pittston coal can be brought by railroad, a distance not exceeding 125 or 130 miles, perhaps less—but little more than one-half the distance you get your present supply! Were it only to open to New-York the vast anthracite deposites of Luzerne, wisdom, I am persuaded, would say, "yes, by all means; make, forthwith, by the nearest and best route, a railroad to Pittston. Two hundred thousand tons of coal a year would certainly descend upon it; paying a handsome per centage in tolls, and the value of the increased trade, to supply the fertile region along the Susquehanna, would of itself be an object of importance." My advice, in relation to the road would be, to make it on the cheapest plan possible, calculating in the course of ten years gradually to renew it, with the improvements which time and experience will most certainly develope and approve. Fifteen thousand dollars a mile would put the work in operation. Miles 130 + $15,000 = $1,950,000—say two millions. Now, 200,000 tons of coal a year, at one cent a ton per mile toll would amount to 260,000, the interest at 5 per cent of more than five millions, and this without taking into the amount the return trade, or carriage of other articles.

My whole plan embraces a continuous railway from New-York to Buffalo. This may be divided into three sections. First, the railroad to Pittston, at the mouth of the Lackawana; secondly, up the Susquehanna to the New-York State railroad, through the southern tier of counties; thirdly, from that railroad to Buffalo. It should be here distinctly stated that the State of Pennsylvania is now prosecuting to early completion the canal from the State line down to Pittston, to which point the Pennsylvania Canal from Columbia is finished, and now in perfect operation. And that the State of New-York is going on with her railroad, (which comes within four or five miles of the State line, where the Pennsylvania canal will strike it,) westerly to Portland on Lake Erie. So that, if the first division indicated, that is, from your city to Pittston, should be pushed vigorously to completion, the two upper sections of the road might be made at perfect leisure, as there would be a perfect communication from Portland on Lake Erie, to Pittston, by the time the first division from Pittston to New-York would be finished.

Let this striking fact be placed in a paragraph by itself, that, by Pittston and the Susquehanna, the distance from New-York to Lake Erie is sixty miles shorter than by any other route. Clinton.

* Doubtless you have many engineers of ample skill; but permit me to say there is one, a young man of first-rate talents and attainments, now engaged on the railroad from Brooklyn down Long-Island, who, I wish, could be drawn to look into this matter. I know he is competent and worthy of all confidence. Should this meet the eye of Mr. L., will he accept the respectful salutations of Clinton, and turn his attention to this interesting subject?

* In Parker's Report to the Senate of Pennsylvania, the distance is set down as 234½ miles.

New-York and Albany Railroad.—It will be recollected that in 1832 a charter was granted for this Railroad, with a capital of $3,000,000. This Road, however,

has not been, as we were in hopes it would be, commenced—and it is therefore necessary that the subject should be again brought before the Legislature.

Of the importance of this route to the citizens of the *city* of New-York, the counties through which it is designed to pass, and to all whose business requires them to travel between the Commercial Emporium and the political Capital, or the interior and extreme parts of the State in a northerly direction, it is entirely useless to speak. Those who have had the misfortune to pass over the route between New-York and Albany during the winter season, can at least appreciate its value; and we should suppose that our citizens would be able, from the rigors of the past winter, during which time, they have been shut out from supplies, to estimate its importance to them. There are, however, many residing beyond its influences, who are not like to be materially affected by the want of it, who may be called upon to act upon the measure, and it, therefore, will not be deemed inoportune, or improper in us, to publish, or rather *re*-publish some important facts in relation to the business of the counties *near* and *through* which it will pass, collected by a committee of gentlemen appointed for that purpose, which, if correct—and we have reason to believe them, at this time, *entirely* within the amount—demonstrate that it will be not only exceedingly useful to the business of those counties, and to the city of New-York, but also highly profitable to those who may invest their funds in its stock.

We are fully of the opinion, and have often expressed it through the Journal, that those who own property along the line of an important *contemplated* Railroad, had better contiribute *one fourth* part of it, to a common fund for its construction, without anticipating *any* returns in the way of *dividends*, rather than that the road should not be made. This, however, is not necessary, as every man who shall invest *one hundred* dollars in this Road, may rely upon receiving, after it shall be completed and in use, at least *ten per cent.* per annum from *it;* and if he owns property *on* or *near* its line, he may rely upon an increase in its value of *five* to *fifty* per cent., and in some places, *one hundred* to *five hundred* per cent. the moment it shall be completed.

Thus far we have viewed it mainly as a benefit to those on its line—it will be found of equal advantage to this city—as it will open an easy, cheap, and expeditious communication, during the whole winter, with the period at which, as we are now situated, we are cut off from supplies from the most productive portion of the surrounding country; and connected, as it will be, with the numerous Railroads leading from Albany, Troy and to the intermidiate flourishing towns in New-York, Connecticut, and Massachusetts, there will be a con-

l trade with our merchants during the

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whole winter—and of course a continual supply of fresh provisions for our citizens. Of the extent of business of the country on the line of the Road, there are *very few indeed* who have a correct idea; and the extent to which it would be increased is less duly appreciated. The remark that "Railroads *create their own* business," will be here clearly exemplified.

The facts, estimates, and statements herewith submitted were collected and made several years since, and it will be proper, in coming to a conclusion at *this* time, to take into the account the wonderful increase of business, as well as the astonishing improvements in the construction of Railroads and Railroad machinery.

"The county of Westchester is the first district to which our inquiries will be directed. This large, populous and wealthy county will be intersected by the Railway at nearly equal distances between the shores of the North and East Rivers. The inhabitants of the most productive parts of this county will thus obtain ready access to the city markets, and the impulse which will thereby be given to the agricultural and manufacturing industry of the county must, from the very circumstance of its contiguity to the city of New-York, afford a large annual amount of tonnage and passengers to the Railroad. In one of the remote towns in this county the tonnage for a Railway has been estimated at near 2000 tons annually, and the passengers at 800 in each direction. The population of this county, in 1830, was 36,476; the valuation of real and personal estate, in 1831, was 9,397,840 dollars.

The county of Fairfield, in Connecticut, lies near the contemplated route of the Railroad, and the interior portions of it can have no other favorable outlet for the products of their industry, which now contribute much to the general business of the city and country. A branch Railway of nine miles will reach Danbury, one of the shire towns of this county, overcoming an elevation of but 48 feet. Some estimate may be formed of the industry and amount of business of this flourishing town, from the fact that two hundred thousand feet of boards are annually used in the construction of packing boxes for the single article of *hats* sent to the New-York Market. The number of passengers booked by the stages at the same place, is said to be six thousand annually.

The county of Putnam, though of limited extent, will afford much for the support of a Railway. Extending from the Hudson at the Highlands to the east line of the State, its most valuable and productive portions will be found contiguous to the Railroad. A partial estimate of its transportation has been made by citizens residing near the eastern border of the county, which amounts to 7000 tons, and 6000 passengers annually. Population in 1830, 12,701. Valuation of real and personal estate in 1831, $2,198,889.

The county of Litchfield, in Connecticut, next claims our notice. The interior position of this large county, and its proximity to our borders, and to the route of the Railway will secure to the latter almost the whole amount of its export and import trade. Possessing, in the Housatonic and its tributaries, a vast amount of water power; rich in its soil and its extensive deposits of iron ore, lime-stone and marble; its productions must be greatly multiplied by the increased facilities which the Railway will afford. The iron of this county possesses the highest reputation, and is now transported from Salisbury, on the borders of this State, to the United States Armory at Springfield, by land, at an expense of twelve dollars per ton. Some estimate of the present business of the county may be formed, by an examination of the following statement of its productions, and their annual value, by John M. Holley, Esq., which has recently been published, and in preparing which, he informs us, that a very considerable list of articles, each of small comparative value, are entirely omitted:

	Value.
Pig and bar iron, &c.,	$293,000 00
Manufacture of Iron, &c.	
Scythes,	53,000 00
Hoes,	7,150 00
Axes,	25,500 00
Rat and mouse traps,	9,500 00
Shoe tacks and sparables,	40,000 00
Shovels and spades,	6,500 00
Augers,	2,000 00
Steel,	8,000 00
Pitchforks,	20,000 00
Ploughs,	3,800 00
	$177,650 00
Other Productions.	
Wool,	$151,000 00
Woollen cloths,	215,000 00
Cotton do.,	15,000 00
Hats,	70,700 00
Shoes and boots,	112,000 00
Carriages and wagons,	38,000 00
Clocks,	382,000 00
Leather,	181,000 00
Cabinet work and chairs,	27,000 00
Cordage,	500 00
Machinery, part wood and part iron and steel,	19,000 00
Brick, clay furnaces, and marble,	38,200 00
Rakes and brooms,	5,000 00
Lime,	5,000 00
Musical instruments,	2,200 00
Buttons,	20,000 00
Cheese,	115,000 00
Butter,	17,600 00
	$1,414,200 00
Pig and bar iron,	293,000 00
Manufactures of iron, &c.,	177,650 00
Total,	$1,884,850 00

The number of passengers to and from New-York, furnished by this county, is very great, and constantly increasing.

The county of Dutchess, which has been long distinguished for its agricultural industry and wealth, will contribute largely to the permanent business of the Railroad. Much of its finest soil lies contiguous to that beautiful valley through which the Railway is designed to pass. Careful estimates of the present amount of transportation have been made in some of the towns in the eastern portion of the county, and the result is highly favorable. An average of eight towns in this county, may be supposed to give their support to the Railway through the year, not to include the business which would be derived from the other towns, and from the flourishing village of Poughkeepsie, in the winter season. The present transportation of three of the above towns is estimated at 10,167 tons, at the annual cost of 36,168 dollars. Applying this ratio to the eight towns, and then deducting one half of the amount, will afford the estimate which we shall venture to give of the present transportation of this county which will pertain

t› the Railroad, and is equal to 13,556 tons annually ,at an expense of 48,224 dollars. The number of passengers which can be obatined from this county is not known. Population of the county, 50,926. Valuation of real and parsonal estate in 1831, 16,188,-739 dollars.

We are next called to notice the amount of business which can be obtained for the Railway, from the county of Berkshire, in Massachusetts, the inhabitants of which, owing to its peculiar position, are more deeply interested in the success of this enterprise than almost any other section of country. An examination has been made of the amount of transportation in thirteen towns in the county, which amounts, independent of certain articles not enumerated, to 20,981 tons annually, which, at the existing rates, costs 106,157 dollars. The remaining seventeen towns of this large county, are represented as affording at least an equal amount, making an aggregate of 212,314 dollars, exclusive of a large number of passengers from the county and from other parts of the country more remote from the Railway. A respectable inhabitant of that county, in a letter to the Corresponding Committee, says: "Although the result of this examination exceeds even our hopes, still, in my view, it is not the most interesting feature of the subject. The business which a Railway would *create*, and the increased activity which it would give to branches now pursued, is the great point. We have marble in this town suitable for every part of the most splendid dwelling, from the foundation stone, to the mantel and pier-table in the parlor. Every variety of color from white to black is here, with the exception of that which is denominated Egyptian. Yet it avails us nothing: we have no means of transporting it to market. What is here said, will, in many particulars, apply with equal force to many other towns." The article of hay, of which in the winter season vast quantities would be sent to the New-York market, has not been included in the estimate.

In the county of Columbia we may estimate an average of nine towns as being immediately connected with the Railway. One of these towns affords a greater amount of transportation than any other town from which returns have been received, and the whole are averaged as equal to the three towns in Dutchess, whose returns have been mentioned. Deducting one half the amount of this estimate, for proximity to navigation and other considerations, there will remain 15,250 tons, at the annual cost of 54,252 dollars. The population of this county is 39,954. Valuation of real and personal estate 9,776,941 dollars.

Passing over the towns which will be intersected by the Railway in Rensselaer county, and the city of Troy, we will consider this county, as well as that of Albany, as forming the northern terminus of the route, the estimate for which will claim our attention hereafter.

The data on which we proceed in estimating the amount of business which will be afforded to the Railroad, though founded on careful estimates in some towns, is necessarily imperfect with regard to others. Some of our estimates may possibly be overrated, others certainly fall short of the truth, and in those towns where a careful re-examination has been made, the amount is found to be greatly increased, and there is good reason for believing that the rerurns on which our results are chiefly predicated, are more precise and authentic than are often obtained in similar cases. We shall now complete our approximate estimation of the business of the country contiguous to the route of the Railway, and shall then give to the travel and transportation, which will pass through the entire length of the route, a separate consideration.

We accordingly present the following summary:

Reduced estimate of nine towns in Columbia county,	15,250	at the cost of	$54,252
Estimate of Berkshire,	41,962	tons at	212,314
Reduced estimate of Dutchess county,	13,556	"	48,224
Litchfield county, estimated at ⅓ of Berkshire,	31,472	"	159,236
Putnam county, partial estimate,	7,000	"	28,000
Fairfield county,	7,000	"	28,000
Westchester county, estimated equal to Putnam and Fairfield,	14,000	"	56,000
	130,240		$586,026

We have thus a total of 130,240 tons now transported annually at the expense of 586,026 dollars. It may be proper to suggest, that much of this business now pays an additional freight on the Hudson, a portion of which will be saved to the Railway, by passing direct to New-York; and although the Railway prices must be lower for the same distance than is now paid for transportation on common roads, still the increased mileage in passing to that city, will go far to compensate for the decrease in price. The effect of the Railway will also be, to greatly multiply the amount of products transported, so as to preserve, if not increase, the gross amount now paid for transportation. Besides this, the general increase of business which may be expected to occur before the period can arrive at which the Railway will be opened, especially with the stimulus of the Railway in prospect, may be supposed, of itself, more than sufficient to make good the above amount to the Railway. Some facts relating to the increase of business in Berkshire will show this in a strong light. About the year 1826 an examination was made into the amount of transportation then afforded by that county, in reference to an extension of the Sharon Canal through the rich valley of the Housatonic. It was found that its transportation was then performed at the annual expense of about 100,000 dollars; and the Committee who instituted the inquiries ventured to predict, that with the aid of the facilities which a Canal would afford, this amount would be doubled in six years. Since those inquiries were made, six years have elapsed, and without the aid of the contemplated Canal, the transportation now exceeds 200,000 dollars; and intelligent persons in that county, who are conversant with its industry and statistics, avow their belief that with the facilities which a Railway on that route might afford, the present amount would be quadrupled in another equal period.

We shall therefore be fully justified in assuming an amount of transportation in the first years of the Railway operations, equal to the summary above recited. Lest, however, we should appear too sanguine, and to remove all possible objections, we will deduct 40 *per cent.* from the foregoing estimate of transportation, which reduces the amount to 351,616 dollars.

We come next to the estimate of the *passengers* which would be afforded to the Railway from the same district of country; and in making this inquiry we are obliged to proceed on data less precise than that which has governed our estimate of heavy transportation. We are, notwithstanding, in less danger of overrating the subject, for all past experience has shown that the amount of travel in our country, particularly on routes connected with its commercial metropolis, increases annually, in a ratio far beyond that of its business or population; and in no case is this increase so high as when connected with the establishment of steamboats and Railroads.

In twelve towns in Berkshire, the passengers to and from the Hudson, are estimated as now paying an amount of 10,720 dollars annually. But the estimate is made on the present residents in these towns, not including transient visiters: and with the increase which will accrue in five years, together with the vast multiplication of travel which the Railway will occasion, and the increase of mileage in the transit of a great portion of these passengers to the extreme points of the route, it will be fair to estimate the amount from this source from these twelve towns, on the opening of the Railway, at 30,000 dollars annually, and the travel of the whole county at 60,000 dollars. Nor will this estimate appear exaggerated, when we consider that the most productive business of a Railway is found to consist in the conveyance of passengers.

We will, however, estimate the travel of

Berkshire county as producing annually to the Railway the sum of	$40,000
Litchfield county,	30,000
Columbia, (including winter travel,)	20,000
Dutchess,	20,000
Putnam,	12,000
Fairfield,	12,000
Westchester,	18,000
	$152,000

We now devote our attention to that part of the travel to and from the intermediate points on the Railway, which is furnished from the cities and counties which are situated at its northern and southern terminations. This important part of the estimate must begin with the city of New-York, which will possess, in this Railway, if we except the Hudson River, its most interesting and frequented channel of intercourse with the country. Thousands of its citizens will be induced to seek, through this accommodation, a respite from the cares of business, in the rural scenery and free air of that delightful region of country, which borders on the route. Thousands also of the strangers who visit the metropolis will be attracted by these inducements, and the exhibitions of manufacturing and mechanical skill which this enterprising country affords, to visit places and objects in the vicinity of the Railway. To form a just view of the amount of this intercourse, and of the business transactions incident upon it, we need but remember that the resident population of the city in 1830 exceeded 207,000 persons; that it is now equal to at least 225,000; and that its real and personal estate is valued at 139,280,214 dollars. Brooklyn, which is but an extension, of the city, had, in 1830, a population exceeding 15,000, which is rapidly increasing, and its valuation is near seven millions of dollars. At the northern termination of the route we have the flourishing cities of Albany and Troy, a large portion of whose citizens are natives of New-England, who maintain a constant intercourse, both mercantile and social, with the land of their fathers; and if we look beyond these limits to the north and to the west, we find the same relations existing, and a corresponding frequency of intercourse, which must needs contribute largely to the resources of the Railway. The valuation of Albany county is 12,739,639 dollars. Its population, in 1830, was 53,570. Valuation of real and personal estate, in

Rensselaer county, including Troy, 9,615,-392 dollars. Population, 49,472.

It is highly probable that this class of travel to and from the intermediate portions of the route will equal that which is furnished by the intermediate country itself, amounting, as we have seen, to 152,000 dollars annually, and making a total of 304,000 dollars; a sum, it will be perceived, which is still below the estimated transportation of the same country. In compliance, however, with our former rule of caution we will reduce this amount to 200,000 dollars.

We have thus an aggregate of 200,000 dollars for the entire intermediate travel of the railway, including not only that which is afforded by the counties which are intersected, but also that which emanates from the county of Rensselaer, and the cities of Albany and Troy on the north, and the city of New-York on the south. Nor can we think this item to be overrated, for, on comparing it with the known amount of travel on stage routes through less important districts, it would evidently justify a larger estimate.

We come now to consider the probable income of the railway, from the business passing from the extreme points through the entire length of the railway, and will first attempt an estimate of that which will pass in the winter months, say an average of three months in each year.

Although the amount of travel between New-York and Albany by the post-road, at this season of the year, is comparatively small, yet all must be convinced, that under the operation of the railway, the business and travel would not only be greatly increased, but more equally diffused through the different seasons. During the season of navigation, not fewer than eight steamboats pass daily on the Hudson through the entire route. One boat is said to have carried 25,000 passengers annually, on an average of past years, and some boats have much exceeded this number. If we allow a season of 35 weeks, and six passages per week, it will give 112 passengers per day for each boat, or an average of near 900 per day; and we may safely allow 75 per day, in each direction, as the average of the long travel in the winter months, when intercourse shall be established by a Railway. This number, at five dollars each, which would be a moderate winter price, will amount to 58,500 dollars. This average may seem too small, and doubtless is so, but it must be remembered that we have previously estimated all the travel to intermediate points on the route. The amount of property to be carried through by the Railway cannot be so satisfactorily ascertained; but as the Railway will form the sole channel of communication between New-York and the interior at that season, and will greatly facilitate commercial exchanges, we will assume the amount of the winter transportation to be equal to the foregoing item, or 58,500 dollars. To this may be added, for light articles transported at other seasons of the year, 12,500 dollars.

There remains but one other source of income to be estimated, which is that arising from the long travel in summer, or that which passes through the entire length of the Railway during the season of navigation, and which, as has been premised, is not relied upon in calculating its profit or utility. It would be a mistake, however, to infer that no income will be derived from this source. The nature of the case, as well as past experience, shows that an increase of the means and facilities of conveyance always increases travel; and that many travellers will be drawn to the railroad from motives of interest or curiosity, and still greater numbers from considerations of convenience, or a desire of change; so that a considerable portion of what is called *pleasure travel*, as well as of the men of business, will be induced to pass in one direction by the steam-boats, and in the other by the railway.

If the number of passengers which now pass daily in the steam-boats, between the extreme points of the route, be reckoned at 800 on an average of six days to the week, they may, at the expiration of six years from the present period, be safely estimated at 1200 per day. Perhaps one-third of th number would be induced to take the railroad; but we will allow 150 per day, in each direction, as the average of the long travel by the railway at the period of it completion; which, in a season of 38 weeks, reckoned at 6 days in a week, gives 68,400 passengers; which, at $2,50 each, will be 171,000 dollars. These amounts require no reduction.

We present the following recapitulation:

Estimated transportation of the country connected with the railway, less 40 per cent., -	$351,616
Winter freights, - - -	58,500
Other light freights, - - -	12,500
Reduced estimate for way travel pertaining to the route from the cities and other parts of the country, - - - - -	200,000
Winter passengers through the entire route - - - -	58,500
To which may be added the estimate for passengers through the entire route during the season of navigation, - - -	171,000
Total estimate of annual income,	$852,116

From the London Repertory of Patent Inventions.

ON SOME RECENT EXPERIMENTS MADE WITH A VIEW TO PROTECT TIN PLATE OR TINNED IRON FROM CORROSION IN SEA-WATER, WITH SOME PROBABLE APPLICATIONS; AND ON THE POWER OF ZINC TO PROTECT OTHER METALS FROM CORROSION IN THE ATMOSPHERE. BY EDMUND DAVY, F. R. S., M. R. I. A., ETC., PROFESSOR OF CHEMISTRY TO THE ROYAL DUBLIN SOCIETY.

If a piece of tin plate is exposed in sea-water for a few days, it will exhibit an incipient oxidation, which will gradually increase; the tin will be preserved at the expense of the iron, which will be corroded. But if a small surface of zinc is attached to a piece of tin plate and immersed in sea-water, both the tin and iron will be preserved, whilst the zinc will be oxidated, on the principle first made known by the late Sir H. Davy.

The author has exposed for nearly eight months in sea-water a surface of tin plate nailed to a piece of wood by means of tinned iron tacks, inserting between the wood and the tin plate a small button of zinc. Under these circumstances the tinned plate has remained clean and free from corrosion; the zinc has of course been corroded. In a comparative experimet, in which a similar piece of tin plate was nailed to the same piece of wood, and exposed, during the same period, to the same quantity of sea-water, without the zinc, the edges on two sides of the tin plate were quite soft from the corrosion, which had extended to about one eighth of an inch. These experiments seem worthy of being repeated and extended

The present demand for tin plate is very great; should these statements be confirmed, a vast increase in its consumption might be anticipated. The opinion may be entertained that it is practicable to substitute double tin plate for sheet copper in covering the bottoms of ships, &c. using zinc in small proportions as a protector. Such applications would probably occasion a saving of nearly three fourths of the present expense of copper sheathing.

It also seems deserving of inquiry, whether tin plate vessels, protected by zinc, may not be advantageously substituted for copper vessels in many of our arts and manufactures, and even in domestic economy. Although it might be presumed, from Sir H. Davy's experiments and observations,* that zinc would protect tin plate from corrosion in sea-water, the author is not aware that any direct experiments on the subject have been published. Sir H. Davy briefly refers to some obvious practical applications of his researches, to the preservation of finely divided astronomical instruments of steel by iron or zinc; and that Mr. Pepys had taken advantage of this last circumstance, in inclosing fine cutting instruments in handles or cases lined with zinc. The author has not heard whether such applications have succeeded, but he has made a number of experiments with a view to protect brass, iron, copper, &c., from tarnish and corrosion in the atmosphere by means of zinc; the results obtained, however, lead to the conclusion, that contact with zinc will not protect those metals in the atmosphere, the electricity thus produced, without the intervention of a fluid, being apparently too feeble to counteract the chemical action of air and moisture on the surfaces of the metals.†

CENTRIFUGAL FORCE.—At Little Green Logwood mill, Middleton, near Manchester, occupied by Mr. George Wolstencroft, there is a grindstone used for grinding the rasping knives for cutting logwood, upwards of 15 feet in circumference, and 11 inches and upwards thick. On the 24th ult., as Mr. John Wolstencroft, the son of the occupier, and another young man, were grinding the knives at the stone, the young man had screwed the machine in which the knife is held for grinding, rather too tight; this being observed by Mr. John, who also saw that the stone was revolving at a tremendous speed, he desired the young man to be cautious. No sooner had the words dropped from his lips, than the stone broke in several pieces, one of which, weighing not less than 6 or 7 cwt., forced its way through a wall a brick and a half thick, and drove a large quantity of the bricks upwards of 20 yards from the wall.—[A similar accident occurred some years ago. See vol. xviii. p. 32.]—[London Mechanics' Magazine.]

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* Phil. Trans., vol. cxiv., for 1824; [or, Phil. Mag. first series, vol. lxiv., p. 30, 233; vol. lxv. p. 203.—EDIT.]

† [The negative results thus obtained by Mr. E. Davy, agree exactly with those of some trials which I have witnessed for protecting steel by this means.—E. W. B.]

LIVERPOOL AND MANCHESTER RAILWAY.

The eighth half yearly meeting of the shareholders of the Liverpool and Manchester Railway Company was held on Wednesday, the 27th of January, in the Cotton Sale-room, at the Exchange, Liverpool; Charles Lawrence, Esq., in the chair. The Report of the Directors for the last six months, which was submitted to the meeting, was highly satisfactory to the shareholders, showing a considerable increase of receipts, and in some important points showing a positive, and in most a comparative, reuction of expenditure. The receipts appear to have been—in the

Coaching department.....	£67,897	19	2
Merchandise department.....	46,375	15	8
Coal department.....	3,682	8	8
	£117,956	3	6

The increase in the merchandise department is the more gratifying, inasmuch as it has taken place in the face of a considerable reduction in the rates of freight made by the Mersey and Irwell Navigation Company, whilst the rates of carriage by the railway remain unaltered. The total expenses (including 3,409*l.* 16*s.* paid for goods destroyed by fire) amount to 71,995*l.* 13*s.* 4*d.*, leaving a nett profit of 45,960*l.* 10*s.* 2*d.* Out of which the Directors recommend that a dividend should be made of 5*l.* per share for the half year; and that 6000*l.* should be appropriated to the purchase of heavier rails, leaving a balance of 1,569*l.* to be carried to the credit of next half year's account. The cost of locomotive power, which has been for some time the heaviest and most formidable item in the expenditure of the Company, appears to be undergoing a gradual diminution. For the last half year it amounted (including the cost of three new engines) to 15,681*l.* 17*s.* 9*d.*, being about 800*l.* less than during the preceding half year. This is a very satisfactory reduction, when it is recollected that there has been a large increase of business, the receipts of the last half year having exceeded those of the half year preceding by upwards of 18,000*l.* In the maintenance of way there is an increase of about 1,500*l.*; and it does not appear probable that any considerable reduction will be made in this branch of expenditure until the line generally shall have been laid with heavier rails. The Report stated that the works connected with the tunnel under the town of Liverpool, and the new entrance in the Old Haymarket, were advancing towards completion, and would be finished by the end of the month of May. It was stated, in reply to the inquiry of a proprietor, that the propriety of forming a new station for passengers at Manchester was under consideration, and that, if formed, it would be covered by a roof, as at Liverpool, to protect the passengers from the weather. The Report, which appeared to give general satisfaction, having been agreed to, and a dividend of 5 per cent. on the last half year having been declared, the meeting broke up.—[Manchester paper.]

Our countryman, Mr. Perkins, has brought out a new steam-boiler for locomotives, of which he speaks in high terms. He claims for it no less than 13 advantages over his previous boiler. We will publish, in our next, his description, or so much of it as we find in the London Mechanics' Magazine.

MR. PERKINS' CIRCULATING STEAM-BOILER.

In 1832, Mr. Perkins took out a patent for a new steam-boiler on the circulating principle, which was more than once noticed in our Journal for that and the following year, and the advantages which it offered freely allowed; while, at the same time, its originality was as freely questioned—that is to say, Mr. Perkins was alleged to have but resuscitated, or rather re-invented (no doubt very unconsciously), a mode of construction first promulgated two or three years before in the pages of the *Mechanics' Magazine*. Mr. Perkins has now produced what he calls "a new modification" of this circulating steam-boiler; and in the first number (just published) of the *Magazine of Popular Science*, edited at the Adelaide Gallery (which owns, we believe, Mr. Perkins for its originator, if not founder), there is a very elaborate exposition of its merits from the pen of Mr. Perkins himself. We are far from subscribing to all Mr. Perkins says in favor of his new boiler, even as thus modified, for notwithstanding he assures us that his statements can be demonstrated "not only theoretically but practically," there are some of them which it would be difficult to reconcile with any received theory; and we cannot forget that this very boiler has been *tried* on the Liverpool and Manchester Railway, *but not adopted*; though Mr. Perkins, in his present essay, takes no notice whatever of that trial or of its results! But mixed up with Mr. Perkins' rather extravagant laudation of his invention we find so many valuable practical hints and so much ingenious and suggestive speculation, that we must place the whole of his paper, with but little abridgement, before our readers. Of the new periodical in which it appears, we must not omit the opportunity of saying that the projection of it does great credit to the Institution from which it emanates; and that though in this its first number it has rather too much of a horn-book character, there is nothing either in its plan or in the talent displayed in it, to forbid our entertaining strong hopes of its proving a most useful auxiliary in the cause of practical science. We cordially wish it every success.—[Ed. M. M.]

Extracts from Mr. Perkins' Paper.

The following are the advantages which result from a new modification of the circulating steam patent, granted to me in 1832:

1. Absolute removal of all the danger arising from explosion.
2. Great economy in fuel.
3. Much reduction of boiler-room, as well as of weight.
4. Not one third of the water in the boiler now used, being necessary.
5. There being no possibility of any deposit of foreign matter in the generators.
6. No furring up of the boiler, as all the deposit will of itself collect in a place provided for it, and be blown off at will.
7. The generators always being kept at the evaporating point.
8. The impossibility of burning any part of the boiler or generators by the most intense heat.
9. The boiler and generators not being in the least affected by expansion and contraction, owing to the peculiar arrangement of the tubes or generators.
10. The perfect and simple method of separating the steam from the water and foreign matter.
11. The getting up of the steam in less than half the time now required.
12. The simplicity of the construction of the boiler, and the ready method of repair.
13. The absence of all destructibility by burning,—in consequence of using anthricite coal,—although the fire be urged to its greatest intensity.

The above facts can be demonstrated not only theoretically but practically. An operating model of this boiler may be seen daily at present at the National Gallery of Practical Science.

Explanation of the first-mentioned Advantage.

The great drawback upon the important invention of steam navigation has been the disastrous effects caused by the explosion of steam-boilers. The great importance of a perfect remedy will readily be admitted. The many experiments which I have made within the last ten years, go to prove that if the steam be generated in tubular boilers, no danger can result from explosion; but there are many almost insurmountable objections to tubular boilers as hitherto constructed, particularly for steam-navigation. The boiler which is now about to be described, possesses apparently all the properties which have hitherto been sought after. To show the reason why this boiler is free from explosions, the causes (of which there are at least three) must be described.

This *first* and most common cause is from the pressure of common steam. What is meant by common or pure steam, is such as has not been sudeenly elevated, or such as has not been compounded with an explosive mixture, by the improper management of the boiler.

The first kind of explosion is quite harmless, as the boiler simply rends or gives way in the weakest place, which is caused from wear, or some defective spot. The *second*, which I some years since accidentally discovered and published, (and which has since been experimentally proved to be correct, by the celebrated French philosopher, M. Arago,) arises from the water getting too low in the boiler. The fire then impinging on that part of the boiler which is above the water, causes the heat to be taken up by the steam, which rises by its superior levity to the top of the boiler, causing it sometimes to become red-hot, and so elevating the steam to a much higher temperature than its pressure would indicate. Now, when the boiler is in this state, and the safety-valve suddenly raised, the water will be re-

lieved from the steam pressure, and rush up amongst the surcharged steam which thus receives its proper dose of water; at the same time, that part of the boiler which has been raised in temperature, giving off its heat to the water so elevated, steam is generated in an instant, of such force as no boiler can resist. This kind of explosion has of late years been very frequent and disastrous, particularly in America.

The *third** and less frequent kind, although most terrific, is undoubtedly caused by an explosive mixture having been formed in the boiler. It has long been known that hydrogen has been often liberated, by the boiler being overheated by improper stoking, as well as not being properly supplied with water; but simple hydrogen cannot explode,—and where it could get its atmospheric air, which is absolutely necessary to form the explosive mixture, it has been difficult to understand. We have only, however, to look at an air-drawing feed-pump, and the source will be readily seen, It is frequently the case that the feed-pump draws air as well as water, arising from its unsoundness, &c. The more air the pump† draws, the less water is forced into the boiler; of course, the boiler is more and more exposed to the fire, and the heated parts of the boiler become oxydised, and rapidly liberate hydrogen; and as sufficient air has been pumped into the boiler to form the mixture, it will be ignited by an overheated part of the boiler, and the tremendous effect can only be equalled by an explosion of gunpowder.

The construction of this boiler may now be described; but the practical objections to the tubular, the compound tubular, and the common boiler must also be described, so that the remedy to these practical defects may be better understood. The two greatest practical objections to the tubular boiler are its furring up and burning out. After great expense and time, I came to the conclusion that until these two practical difficulties could be removed, they would be fatal to the economical generation of steam for any other purpose than that of steam-gunnery. I have, however, at last been so fortunate as to hit upon a modification which has completely removed all objection to this method of generating steam, and which I will now attempt to describe.

This new boiler is made up of generating tubes and the common flat-bottom wagon-boiler; from this flat-bottom a series of tubes hang perpendicularly over, and in, the fire, from one to two feet in length, according to the size of the boiler, and from two to three inches in diameter. On the upper side of this flat-bottom is a continuation of these tubes projecting the same distance into the water in the boiler. In the interior of the tubes which hang in the fire, is fixed a thin tube, wo inches in diameter; when the tube is 3 inches, internal diameter; open at the top and bottom, and ten inches in length, this tube stands upon three legs, each one inch long, and the water stands level with the top of it. These generating-tubes are hermetically-sealed, so that the steam which is formed in the interior of the upper half of the tube cannot possibly escape.

The important effect of circulation is more apparent in this modification of the boiler than in any other which I have tried. The upper, or evaporating part of the hermitically-sealed tube, contains steam of a temperature of about 80° above the boiling point, when the steam is generating at atmospheric pressure; but when generating at a higher pressure, the evaporating point increases in a geometrical ratio. This part of the tube, which is surrounded with water, is incased in a very thin tube, open at top and bottom, which causes a very rapid circulation, and sweeps off the heat so effectually, as to be certain of keeping the steam in the upper part of the tube, at the evaporating point. Experience shows that, after the steam begins to form, not only the fire part of the tube, but the evaporating part of it, which is in the boiler, receives no more addition to its temperature, not even one degree—which proves the great importance of rapid circulation.

It is well known that water is a worse conductor of heat (particularly downwards) than any other matter; but at the same time, the property which water has of carrying heat upwards, is greater than any other matter. Now, this law of the upward-carrying power of water is taken advantage of, and by filling the tube about one third full of water, the steam which is generated is given off at the top of the internal tube, and will constantly keep the evaporating chamber filled with steam, of a temperature in proportion to the density of the steam in the boiler. The effect of the most intense heat serves only to generate steam the faster, without raising the temperature of any part of the boiler, generating-tubes, or steam; while without circulation, the boiler would, as is often the case, get red-hot, and generate less steam, by driving off the water from contact with it, and materially injure the boiler. So long as there is enough water in the bottom of the boiler, to be above the bottom of the circulating-tube, say two inches, no derangement of the tube can take place, as the steam and water will, although it is obliged to rise 12 inches, sweep off the heat from the evaporating-tube, which will prevent an explosion of the tube, and which would inevitably take place, when the boiler gets empty or dry, were it not that in the centre of the sealing-plug is affixed a fusible metallic plug, which is rivited into it, and will melt before the steam is sufficiently powerful to burst the tube.

For marine and locomotive purposes, it has been found that brick-work must be dispensed with, on account of its weight and bulk; of course, the fire must be made within the body of the boiler. Now, it so happens, that this new modification of the tubular boiler is extremely well calculated for an internal fire-place; for we have only to extend the outward row of tubes down to the firebars, and we have the most convenient and economical fire-box.

Second Advantage.—Although it is not yet accurately ascertained what the saving of the fuel is, yet, from repeated experiments, I have no doubt that it will amount to one third of the fuel now used by the best marine boilers.

Third Advantage.—The reduction of boiler room is owing to the greatly increased evaporating surface in the boiler, which allows much reduction in size, and for the same reason in weight.

Fourth Advantage.—In consequence of the interior of the boiler being filled with evaporating tubes, which displace a large portion of the water, as well as the reduced size of the boiler itself, it is not too much to say, that one third of the water commonly used will be sufficient.

Fifth Advantage.—In consequence of there being no possible escape from the hermetically-sealed tubes, there cannot be any deposit, as the same water in the generator may be worked over and over again, *ad infinitum*.

Sixth Advantage.—The furring up of the common boiler is occasioned by the sluggish circulation of the water in the boiler, and the extra heat at the bottom of it. But forced circulation not only takes up the extra heat, but keeps all the foreign matter in motion, and as there is a much more rapid circulation at the fire-end of the boiler than at the other, all the matter that would otherwise deposit and become fixed, finds its way to the other end, and can be drawn off by a stop-cock at pleasure, as it will never incrust.

Seventh Advantage.—The generator cannot get above the evaporating* point,

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* This theory has not, to my knowledge, been published; and until recently, I did not see how the atmospheric air could find its way into the boiler, which is so essentially necessary to form the explosive mixture.

This kind of explosion cannot take place in the new boiler, since no hydrogen is formed in it; for no part of the boiler is exposed to the fire but the bottom, which is certain to be kept at a temperature quite as low as the water in the boiler, which surrounds the generators, by the dashing down of the water outside of the circulating tubes.

Having had about twelve years' practice in generating high steam, from 1,500 pounds to the inch downwards, and having established the fact, that no dangerous result has occurred, although a great number of explosions have happened; and having at length removed all practical difficulties, I feel warranted in undertaking to guarantee to the public a system of generating steam of any required power, not only with increased economy, but with perfect safety.

† If the feed-pump is surrounded with water, as is inevitably the case with condensing-engines (and only such are used in this country for steam-navigation), atmospheric air cannot get into the boiler. Upon inquiry, I find that nearly all the feed-pumps used in America, are worked without having water outside the pump. This undoubtedly is one of the reasons why there has been so many more accidents in America than in England.

* To prove the best temperature to generate steam, I prepared an iron cup, of massive thickness, cast for the purpose; it was heated to a white heat, and, whilst it was allowed to cool gradually, several measures of water were placed in it, one at a time, each in succession, as soon as the previous one had evaporated to dryness.

The 1st measure in evaporating occupied 90 seconds.
2d 80
3d 59

The vapor, or steam, thrown off, began now to appear, and became more distinctly visible with the evaporation of succeeding measures of water

4th measure in evaporating occupied 30 seconds.
5th 20
6th 12

7th measure showed what I had termed the evaporating point, and in a dense cloud of steam, evaporated suddenly in 6 seconds.

8th measure occupied a longer period, viz. 10 seconds.
9th measure in evaporatisg occupied ... 20
10th 32

And the 11th measure did not boil.

The first measure of water, although contained within the iron cup at a white heat, was perceptibly not in contact with the metal, but was repelled to some

since the extra heat is for a certainty swept off by the rapid circulation.

Eighth Advantage.—Experience shows that wherever circulation is active, no heat can get above the evaporating point, let the heat be ever so strong.* This boiler is so constructed that no part of it is exposed to strong heat, where strong circulation is not at the same time going on; consequently no over-heating can by any means take place. It is a fact, that no extra heat can get into the steam, since no heat is suffered to pass into the boiler above the water, let it get ever so low.

Ninth Advantage.—The tubes of the locomotive tubular boilers now in general use, are riveted at each end; and as no provision is made for guarding against expansion and contraction, the wear and tear is enormous. The tubes, however, in this boiler are connected in the middle, and each half is allowed to contract and expand without impediment.

Tenth Advantage.—To separate the steam from the water and foreign matter, a small steam-chamber is attached to the top of the furnace-end of the boiler. A pipe somewhat larger than the steam-pipe passes from the top of the boiler to the bottom of this steam-chamber. Directly over this pipe, a dome is fixed, about three quarters the diameter of this chamber; the depth of this dome is rather more than half a sphere, and within two inches of the top of the pipe. From the bottom of the chamber there is also fixed a return-pipe half the size of the steam-pipe, which leads down to within two inches of the bottom of the boiler. The operation is thus: When the steam rushes into the chamber, it takes with it more or less water and foreign matter (this is what is technically called priming,) which strikes the concavity of the dome, and throws down the water and foreign matter to the bottom of the chamber, while the steam in a pure state passes off through the steam-pipe, and the foul water returns to the bottom of the boiler through the return-pipe.

Eleventh Advantage.—The steam is got up much quicker than in any other boiler, in consequence of the great evaporating surface within it, and the diminished quantity of water in the boiler.

Twelfth Advantage.—The construction of this boiler is extremely simple, the bottom plate, after having been perforated with proper-sized holes, female coupling screws are firmly rived into it; the lower half of the tubes, which has been reduced one third in size, about two inches from their ends, is formed into a male screw, to fit the female coupling-screw. This male screw is faced perfectly flat, and the shoulder is made to be screwed firmly in contact with the bottom of the boiler. The upper half is screwed in the same manner. The face of this screw is rounded, so that when it is brought in contact with the flat surface of the lower half, it may be the more certain to make a perfect joint. The upper half is not allowed to touch any part but the flat surface of the lower half of the tube. The plug-nut, which is used for hermetically-sealing up the tube, is perforated in the centre with a small hole,—say one eighth of an inch in diameter, and filled with a fusible metal, which will be driven out before the tube will rend, and which could only take place should the water be allowed to escape from the boiler.

The wagon-boiler is considered the weakest form, but this new boiler is altered somewhat in shape; the bottom is perfectly flat instead of concave; the sides are also flat; the top is semicircular. The female coupling-screws undoubtedly materially strengthen the flat bottom. The boiler is to have tie-bolts from the top, the number of which is to be determined by the strength of the steam to be generated in the boiler; they pass down vertically between the tubes, and are screwed into the flat bottom of the boiler. Tie-bolts are to be used also to hold the flat sides of the boiler from bulging out when used for high steam. None of the nuts of the tie-bolts are exposed to the fire, consequently no objection can arise from that source. This boiler may be made much stronger than any other, on account of its diminished size; setting aside the absence of any danger from the second and third cause of explosion, which has been described, the ends of this boiler, which are flat, may be made sufficiently strong by ribs. In fact, this boiler must be pronounced a perfectly safe one, since only the first kind of explosion can take place, which is absolutely harmless; the first kind has also been described. The ease with which this boiler can be repaired is not one of its least recommendations. Duplicates of the tubes may always be at hand, and if any give way, from unsoundness or any other cause, they can be readily replaced, as they are fac-similies of each other.

Thirteenth Advantage.—All persons who have been in the habit of using anthracite coal, know that the intensity of its heat is so great, that if urged to its greatest power, the best fire-brick is readily fused. It is on this account that it is so difficult to be used for raising steam; still, some careful stokers have used it to great advantage. It is, however, done at a great sacrifice of heat, —for slow combustion and thin firing only will answer. To produce the greatest effect, rapid combustion with a deep fire is necessary. In the new boiler, the heat cannot possibly be too great. This coal, which is called in Wales, stone-coal, may be obtained there in any quantity, and is undoubtedly the most economical where it can be used, as is the case in this boiler.

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distance from it in a state of buoyancy, and there moved freely in every direction. So circumstanced, the water evaporated slowly; but when, by the evaporation of successive measures, and the lapse of time, the iron was cooled down to the "evaporating point," the water then evidently came in contact with the iron, and the augmented rate of evaporation was as 90 to 6, or as 15 to 1, the rate being increased or multiplied 15 times; or, in other words, a given quantity of water was converted into steam, 15 times quicker at a moderately low, than at an intensely high heat.

* It is a curious fact, that there are now many boilers which have been in constant use for more than fifty years—the cause is, that there boilers are sufficiently large to make all the steam required, without being forced; this is done with a great sacrifice of fuel: but since it became necessary to economise fuel, the boiler has been very much reduced in size and altered in form, exposing many parts to be overheated It is true, such boilers raise much more steam with the same fuel, and undoubtedly much more is saved in fuel than is lost in wear and tear of the boiler. This is noticed, to show the great advantage of so constructing the boiler that the heat will always be kept down.

From the London Mechanics' Magazine.

ENGLISH AND AMERICAN STEAMERS—AVERY'S ROTARY ENGINE.

Sir,—I should feel obliged for further information, through the medium of your Magazine, from some of your many American readers, relative to Avery's recoil engine, and also a New-York steamer, mentioned in the *Encyclopædia Metropolitana*, the De Witt Clinton.

The cylinder of the De Witt Clinton is 63 inches diameter; 10 feet double strokes; revolutions 26 per minute; effective pressure, 12 lbs. per square inch on the piston —323 real H. P. Is it not a mistake to call it 646 H. P., as nothing is said of two engines, and one is more powerful than any at work in England *at present*. The Radamanthus is 220 nominal H. P.; has two engines; 55 inch cylinders; 10 feet double stroke, 20 per minute going together with low steam; say effective pressure 10 lbs. per square inch on piston—about 290 real H. P. The De Witt Clinton draws only 4 feet 6 inches water, and ought to be impelled by one such engine faster than any sea-going boat in Europe, at least before the wind. Four valves are mentioned 17½ inches in diameter; the number required for a double-acting engine. How are these managed with 20 lbs. steam per square inch on the safety valve? That the thing is well managed in America I doubt not; the load must be near three tons on each of the steam valves, unless they are balanced as in Watt's plan, or made like Hornblower's double-seated valves, such as are used in Cornwall; or Tredgold's packed cylinder modification; or according to some other similar plan. The expression, "steam 20 lbs. per square inch on the safety valve, *expanded inch cylinder, 10 lbs. average*," I presume means steam 20 lbs. per square inch on the safety valve expanded in the cylinder to 10 lbs. average. The engine apparently works expansive—how much is the question? Do the Americans usually follow their Consul's example, as given in the *Edinburgh Review*, and divide the lbs. per square inch on the safety valve for expansion? In this case, I shall assume 30 lbs. pressure on the piston per square inch; expanded, perhaps, to 22 lbs.; rather high for condensing. Or, is the steam cut off at one third? If so, this would give 10 lbs. per square inch pressure, or 4 lbs. below atmosphere, at the end of the stroke, or an expansion of three times, and an efficiency of gross power of about 18¾ lbs. per square inch on the piston. But this would scarcely produce 12 lbs. ditto effective pressure; while the first plan gives rather too much. A corrected statement would oblige, and is requested.

The following estimate was made on the first appearance of the account of Avery's engine, for a gentleman who had some idea of erecting one to work a small circular saw, to cross cut borrel-staves, &c. All

the difficulties of the quantity of fluids issuing from a given aperture, at a given pressure, are avoided; as the estimate is founded on the possible effective power which can be produced by the fuel used. Both the weight of the fuel, one half of wood, and the time of consumption, must be assumed in consequence of the defective account. In mining engines, 24 hours is a day; in manufactories, sometimes only 12 hours, which I assume; and, taking half a load as half a ton is 1,120 lbs., and *oak* to coal being (see Engineers' Pocket-Book) as 1,089 lbs., to 1,120 lbs., the fuel is equal to 618 lbs. of coal, and 7 lbs. of water evaporated per lb. = 4,326 lbs.; say 70 cubic feet of water. The steam in lbs. per square inch, on safety valves, is 80 lbs. atmosphere 94¾ lbs. pressure; = to 23,500 lbs. do, on the square foot, + 310, about the volume of steam due to one of water (see Tredgold) at 6⅕ atmosphere, then we have 4,185,000 lbs. + 70 = 282,950,000 lbs., one foot high efficieney for 12 hours = 39,300 —, 1 atmosphere wasted = 32,750 lbs. 1 foot high per miuute. Taking however two fifths of this for effective power for 12 hours, for half a load of oak wood. It appears from Dr. Davies Gilbert's investigation, that the effective power can, in no case exceed half the efficiency; and that, for this, the velocity of the motion of the aperture, at the end of the arm, must be three fourths of that due to the steam pressure, or a velocity about equal to a common shot. The velocity of 37,660 feet per minute is not half that which is most effective; though it must be admitted that four hundred and twenty miles per heur is *considerably fast*. The American engine seems just within the limits of possibility, since the power is five times that assumed by Mr. D. Gilbert, and the velocity so much less, that iron arms may be just enabled to withstand the centrifugal force. More facts of work performed are requested. The principle of recoil is the first known application of steam power, though for useless purposes; but the execution of *duty* will reflect credit on American ingenuity; the more so from the well-known and frequent failure of similar attempts in Europe. The advantages of expansion, however, must be abandoned, even if Avery's engine should chance to rival the *common* high pressure engine, not worked expansively.

How to observe requires an observation, and deserves more. The distinction between steam pressure and steam in lbs. per square inch, on the safety valve, should be attended to (the gross pressure in the cylinder, as well as the effective ascertained is known). This is equally required for high pressure engines, since the wasted atmosphere is one-tnird of the efficiency or gross power of steam of 30 lbs. per square inch on the safety valve, and one fifth of steam of 60 lbs. ditto; and, in all cases, if worked expansively, it should be stated at what part of the stroke the steam valve is closed. Believing that many American steamboat engines, (from various hints, however, rather than statements) are worked expansively, I am desirous of information as to what extent expansion is there in practice carried, when acting against an uniform resistance.

Yours, &c.,

E.

—— Mines, Cornwall, Feb. 16, 1836.

VISIT TO THE QUICKSILVER MINES OF IDRIA; IN A LETTER FROM AN OFFICER IN THE AMERICAN NAVY.

You know I travelled through Germany as a pedestrian—a mode of travelling which I would recommend to others through that interesting country.* You must imagine me then on the second day of my journey, from Trieste to Vienna, in a region thickly settled and well cultivated, and with a mixture of hill and dale sufficient to make it highly picturesque. An old countryman with whom I stopped to converse about noon, informed me that by taking a cross-cut over the country, I should make my road to Idria much shorter than by following the highway, and as I am fond of by-ways I received his information with pleasure, and soon after struck into a wagon track, to point out which to me, he kindly left his work. The wagon track, after leading me through some retired villages, dwindled into a foot-path, and even this soon after disappeared and left me alone among the hills: but a lover of nature is never solitary, and particularly with such varied and beautiful scenery as almost every step opened to view. I am strongly tempted to describe some parts of it, and also the simple and hospitable manners of the people—but this would not be exactly suited to a Journal of Science. The country towards evening, became a constant succession of steep rounded eminences, generally of considerable height, and just before sunset, reaching the summit of one of highest, I had just under my feet the pretty little town of Idria. It is situated at the bottom of a deep valley or green, the houses were white, and as the streets have to follow the windings of the green ravines, it has a simple and very pleasing appearance. Near the center, is a conical hill with a church on its summit from which a line of a dozen little chapels, along the side of the eminence, showed the course of the Via dolorosa—sometimes an appendage to papal churches. A stream of water about forty yards in width, dashing along the bottom of the valley, and several of the excellent German roads, running zig-zag up the steep ascents completed the view. At the entrance of the village my passports were examined, and the officer having ascertained that I wished to examine the mines said he would send a person to accompany me. Accordingly, a sergeant soon after called at the public house where I lodged, to say that the mining operations were carried on day and night, and that I could enter at any time: I had noticed from the hills a dark crowd of men in front of a large building, and those he told me, were the evening gang about commencing the descent. I appointed 6 o'clock in the morning, and on waking, found him waiting for me. At the building alluded to, which is on one side of the village, and covers the entrance to the mines, we changed our dresses, ane the keeper unlocking an iron gate, we found ourselves in a horizontal gallery three or four hundred yards in length, running directly into the hill, at the foot of which the edifice is created. Here we came to a small chapel with a light burning before the picture of the virgin, and turning short to the left commenced the descent. It has nothing difficult, being effected the whole way by means of stairs in pretty good order: indeed, the mines have nothing corresponding to the ideas of terror which we are apt to connect with such places, except the atmosphere, which throughout the mine, must be strongly impregnated with mercurial vapor, and is constantly producing salivation among the workmen. Having descended by seven hundred and twenty-seven steps, reaching to a depth of one hundred and twenty-five fathoms, we arrived at the region where chiefly the cinnabar is procured. The mining operations are carried on principally in galleries, the friable nature of the ground or rock seldom admitting of larger chambers. The cinnabar is in strata of from two to six inches in thickness, and of a variety of colors from dark to light red, the quicksilver sometimes being mixed with it, sometimes occurring in the intervening strata of earth or stone. Sometimes the cinnabar is of a brilliant red, and once I found it in small crystals, but such specimens are rare: generally it is of a dull red color, and the stone is so brittle that nothing more than a pick-axe is required. The strata affording the quicksilver appeared to have no particular direction, and occupy about one third or one half of the entire mass of rock. Proceeding a short distance, however, we came to galleries where the cinnabar is less common and the quicksilver is the chief object of search. It occurs here sometimes imbedded in a friable rock, sometimes in a kind of earth, in appearance and hardness resembling talcose slate, but principally in the former. Generally, it is in particles too minute for the naked eye, but often when the rock is broken, small globules present themselves, varying from a size just large enough to be seen, up to that of a common pin's head. These globules are not distributed at random through the mass, but the substance in which they occur forms strata usually about one inch or two in thickness.

Descending still lower, we soon came to the richest part of the mine. Here the *gangue* consits almost entirely of the talcose earth mentioned above, and the globules are so large that when it is broken, they fall out and roll to the bottom of the gallery. The laborers here are relieved every four hours, being unable, from the state of the atmosphere, to work longer than this at one time. In the other parts of the mine they work eight hours. There are three hundred and sixty altogether employed in the mines, divided into three companies, and working, each, eight hours out of the twenty four; their pay is only from 15 to 16 kreutzers (12 to 13½ cents) per day, the usual pay of

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* We most heartily second the writer's recommendation. For health and information no mode of travelling is equal to it, and what is of more importance to some, it is fashionable in Europe just now.

day-laborers throughout Germany. I found several of them suffering from the effects of the mercury.

Having loaded myself and the guide with specimens, I returned by the same way to the upper mine and proceeded next to examine the washing rooms, which are situated a few hundred yards from the mines. The *gangue* containing the metal is carried to this house, and if it is of the earthy kind, it is broken up and thrown upon large seives, by means of which the loose or native quicksilver (called here yung frau or virgin quicksilver) is separated from the earth: the latter is then cast into shallow boxes open at the ends and a little inclined, and a gentle stream of water being made to pass over it, a rake is used, and the earthy matter is carried off. There are seven of these boxes in succession, and by the time the residuum reaches the last of them, it resembles a heavy gray powder, and is sufficiently pure to be carried to the vapor furnace. The stony fragments require only a slight washing to cleanse them from the outward earthy impurities.

The furnace is half a mile lower down the valley and at the extreme end of the village. It consists of a circular walled building about forty feet diameter by sixty in height, on each side of which is a continuous range of chambers ten or twelve feet square, and nearly as many in height: by means of small square openings in the partition walls, the air is allowed to pass from the centre building to the remotest. Each has also a door communicating with the external air. These buildings are all of stone and are plastered within. The *gangue*, after being prepared in the washing house as already described, is removed to this edifice and placed in earthen pans four inches deep and fifteen in diameter, which are piled up so as to fill the centre building. The doors of the chambers are then carefully walled up; and a strong fire having been lighted under the centre building, the quicksilver rises in the form of vapor, and passing into the small chambers, is there condensed by the cold atmosphere around them. Some of the gangue, you will observe, is brought here in the form of the native rock: I understood them to say that the expansive power of the vapor, together with the heat of the fire, was sufficient to cause the rock to disintegrate and thus allow the escape of the quicksilver. When this process is over, the door ways of the chambers are once more opened, and the quicksilver, which is found chiefly adhering in drops to the sides and ceiling, is scraped off, and running into a hollow in the floor, is taken thence to the cleaning and bottling room. It appears to act on the mortar of the chambers, for I found the latter flaky, and the crevices all filled with small globules.

The cleaning process is very simple, a piece of canvass being merely spread over a funnel, and the quicksilver being made to pass through this, comes out sufficiently pure. That intended for home consumption is then tied up in sheepskins, while that for exportation is put in iron bottles large enough to contain sixty-eight pounds. The furnace is kept in operation only during the winter months, and then the vapor which escapes from it is a serious annoyance to the town: they have a blast three times every fortnight.

The price of quicksilver at the mines is 112 florins for one hundred German pounds, or about 44 cents for an American pound. The quantity annually procured is about one hundred and sixty-four tons: formerly it was greater, and brought a better price, their market, which is chiefly in China, having been injured by competion from the quicksilver mines near Almeria, in Spain. —[Am. Journal of Science and Arts.]

From the Annals of Education.

EDITORIAL CORRESPONDENCE.

Coblentz, on the Rhine, Nov. 26, 1835.

Unexpected circumstances of a private nature, have made it my duty to visit Switzerland at a season which is not favorable, and the facilities offered by steamboats on the Rhine, led me to choose that route. But I find myself amply repaid for all the "disagreeables" by the interesting character of the scenery, compared with the monotonous, wearisome roads of France; and, above all, by the gratification of my own taste, on this classic ground of education.

In travelling through Germany, one who is interested in education meets continually with kindred spirits. In consequence of the share which the government takes in education, it is not so frequently a trade. There is less of private speculation, and the little jealousies and narrow views to which it gives rise. The wise measures of the government have also had the effect of making education a profession, both honorable and lucrative—and of inviting men of talents and eminence to devote themselves to it. As a necessary consequence, it has called up the attention of all who cultivate their minds, much more than in other countries; and you will find most men of intelligence familar with principles in daily use, which are regarded as idle theories by not a few of our teachers.

It is not less striking to a stranger, to find men of all professions who speak so decidedly as to the necessity of religious school instruction. But I must reserve this topic for a separate article, in order to do it justice—I will only remark, in passing, that they consider our practice on this subject as equally *unchristian* and *impolitic*; as preparing our way to the grave of free nations; as increasing the spirit of licentious liberty to such a point that we shall be obliged to admit, if we do not demand, a military despotism.

To one who feels that on the education of the young depends the destiny of his country, and all the objects of affection it contains; who believe that the progress and the extension of improvements in education is the only means of enlightening and civilizing and christianizing the world, it is truly cheering to find some of the most eminent and able men of church and state, devoted to the single duty of studying and examining—of making experiments and ascertaining results, in this "science of sciences"—men too, who know and feel, that such a term involves no exaggeration, and indicates no peculiar professional or personal enthusiasm. It is even gratifying to find, that such men, occupied exclusively with a subject, which has been regarded as too inconsiderable, or too uninteresting to require an *entire periodical*, and eager to communicate every information to an inquirer, are obliged to reflect, and make special arrangements, before they can devote a few hours to a stranger.

In passing through Cologne, seven years since, I visited the school Inspector of that district, and found him in the midst of a mass of papers, assisted by a secretary. He received me with great kindness, and gave me such documents as would aid me in my inquiries; but as my stay was short, he could not lay aside or arrange his occupations so as to allow me much time for conversation. In my present hurried journey I was unable to call upon him.

At Neuwied,* on the Rhine—a few miles from this city—I stopped to visit a public seminary for teachers; and here I found several able men whose whole time and power were devoted to study and experiment and instruction as to the best mode of "keeping a school"—a task for which any youth of seventeen, any poor scholar of a college, any one who is unfit for any other profession, is quite competent in our country; and all this care and labor is even wanted on *elementary schools*. When will it be seen that it is a more delicate, a more difficult task to be the teacher of a school of children, than to be a professor in a university? The seminary at Neuwied, I will describe hereafter, when I have leisure to copy and complete my notes.

In Coblentz I found two school officers, who received me with great kindness, and in whom I was much interested. One was a Catholic who has given up his office, but who had just returned from a tour, in which he had assisted in organizing a Catholic seminary for teachers. I could not but wish that some of our statesmen could have seen the spirit with which a man, whom they would not hesitate to receive into their ranks—could enter upon, and speak of this humble, or, as I regard it, this *noble* employment.

The other gentlemen is a Protestant, the inspector of this district. I found him also in the midst of his business—and it was not till he had examined his papers and memorandums, that he could venture to promise that he would see me on that day. He invited me to the evening meal of his family. The opportunity was, however, so precious, that I could scarcely give up any of its moments to that free, social intercourse, which is so characteristic of a German family; and I found so much patience and indulgence with my inquiries, that I was tempted, I fear, almost, to exhaust it. This gentlemen was kind enough to give me, in parting, several interesting pamphlets, and also a copy of some of his obsevations in MS. during his tour of inspection. He has since been so attentive as to send

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*This place will be remembered by some, as the residence of Maximilian Prince of Neuwied, who published his travels on the Rhine. He has a fine collection here of American animals.

me an elementary work on music, published for the use of Prussian teachers, which I hope will furnish some assistance to those who are laboring on this subject, in our own country.

On the way hither, I met with a very interesting man who has no official connection with education, but who gave evidence of reflection and of interest in the subject which is rare with us, and which was least to be expected in a veteran officer of the Prussian army. In his general views he fully sympathised with others I have mentioned, but on one topic, I found his opinions unexpectedly and fully coincident with my own.

He observed that the Universities were becoming more and more sources of disorder and of "*demagogy*," if I may use the expressive German word. For the first it will be sufficient to say, that a private Musical Society in Heidelberg, was recently assaulted by a band of students, who were determined to enjoy its pleasures uninvited, and that on their being repulsed, they resorted to the war-cry of the University, ("*Bruschen heraus.*" Out students!) rallied the whole body to revenge the pretended injury, and produced a mob which resulted in some serious, if not fatal wounds. For the last, it is only necessary to allude to the fanatic assassin, Sand.

"And how," replied I, "can you expect it to be otherwise on the present plan? You keep your sons under the paternal roof, in the midst of all the restraints of social life, and family endearments, until the age when the passions just begin to assume their *greatest strength*, and reason is too immature to govern them; and then send them forth *unattended, unrestrain d*, and in their private life almost unobserved, in the midst of others as immature, and as ardent as themselves! How can any man who knows human nature expect any other result, than that the young seaman who is launched for the first time on a stormy ocean, and without a pilot, should lose the command of his helm? Happy if he escapes shipwreck! For myself, continued I, I regard this very course as a source of ruin to a large number of our young men." "You are right," was his reply; and he went on to express his own views with great force and clearness. I have not time to give you the details. He added, that for this very reason he had not suffered his own sons to leave their home until they were twenty-two years of age. Would that some of our American parents would adopt this course, even partially. It would save many a melancholy shipwreck of character and hope—it would save many a parent's heart from "*the anguish of death.*" Sad error, to plunge a youth into temptation before he has learned to resist it,—to hurry him into the duties of life before he is competent to perform them!

Hofwyl, Dec. 19, 1835.

In conversing with gentlemen interested in education in Germany and Switzerland, I have uniformly found the most painful surprise, that a nation so enlightened, and generally considered so free from the corruptions of the old world, as the United States of America, should have any doubts on the great question, whether it is a duty of the State to see that *every child actually receives instruction*, and is thus made capable of knowing, and of doing his duty as a citizen; and whether religious instruction ought to form a part of the course of every elementary school.

The uniform remark is, that it is impossible our institutions can be permanent—nay that they can long exist, unless they are sustained by intelligence and virtue in the people, a principle which was long since announced by the "Father of our Country"—and this, without universal instruction,—without thorough—early religious instruction, they believe it is idle to expect. They say that our very prosperity increases our danger—that all this material and pecuniary power, if it be not directed by a higher degree of cultivation, extended to all the people; if above all, it be not guided and restrained by moral principle, deeply fixed, and firmly based on religious truth—will only produce among us, in another form, that absorption in material things, that sensuality which destroyed every vestige of liberty and greatness in the Mistress of the world. They see in this neglect, the sources of those disorders which now render us the objects of pity, even to the subjects of despots in Europe, and as friends of mankind, and, many of them free governments, they tremble at these bodings of moral ruin, where they imagined an asylum of liberty and virtue.

They hear with surprise that the jealousy of those sects, which differ only in a few points which they generally admit are not essential, should be suffered to prevent religious instruction. They ask how it is, that with so much light, and so much of the spirit of religion as we possess, such narrow feelings can be allowed to interfere with so important an object. They are still more astonished to learn, that this jealousy frequently forbids even instruction in the history of the bible. But they ask—"Will not your pastors, then, supply this defect by regular lessons, as is done where our villages are divided in religious opinion?" and their astonishment, is, if possible, increased, to hear that *Christian parents*, and *Christian pastors*, who think it desirable that their children should spend six hours daily—the *best*, if not the whole time which they are capable of spending in intellectual effort in acquiring knowledge which is bounded by this life and its material objects,—and this for six days in the week—should consider it sufficient to devote one day only to those subjects which are equally necessary to their character and happiness here, and to that eternal life which is to come.

We need not say that we can offer no adequate apology for this inconsistency with other principles and professions; that we can give no reason but those of habit, and prejudice, on which the abuses of the old world are founded, and which we treat with so much contempt, when they are referred to, in justifying or excusing institutions and measures which are unlike our own.

SUGGESTION IN CIVIL AND MILITARY SURVEYING.—NEW INSTRUMENT FOR MEASURING DISTANCES, ETC.

The following article from the United Service Journal, is well worth attention. The instrument there proposed, would not only be found useful in determining distances for the details of the topography of the surrounding ground—but we are convinced, that properly constructed, it can be applied to the nice measurement of all distances—as the instrument contains within itself a constant base line.

We have seen much of surveying instruments of every description, and have paid some attention to the comparative accuracy of different forms—and we do think that an instrument on this plan containing the means of *perfect* adjustment, (two or at most four adjustments would be required,) would measure distances from one to two thousand feet far more accurately than tapes, chains, or any of the usual instruments for lineal measurement.

Instead of a single straight edge, we would suggest a pair of them, forming a groove in which the support to the mirror should slide, and by making this support of considerable length we obtain a more accurate instrument, as the inclination of the moveable mirror would be less liable to variation.

The mirror might be moved by means of a long micrometer screw, and from this the reaching of the smaller posts might be made, instead of from a vermier, or even with it to operate as a check.

To fit such an instrument upon a tripod—to add the necessary apparatus for levelling, &c., would require but little ingenuity.

We intend having such an instrument made, and testing it rigorously—we shall then be enabled to speak from our own experience in the matter.

It is evident to every one that the distance of objects perfectly inaccessible may be obtained at one observation and reaching, it being only necessary to select a well defined line or object, as the branch of a tree or point of a rock.

The latter part of this article we have inserted with the view of showing that the measurement of distances by means of two wires in a telescope, &c., *is* (as we have always maintained) *no new discovery*, though we have seen an instrument on this principle, for which a patent was obtained, commendations given, praising in particular the novelty of the method, &c., and above all for which an exorbitant price was demanded.

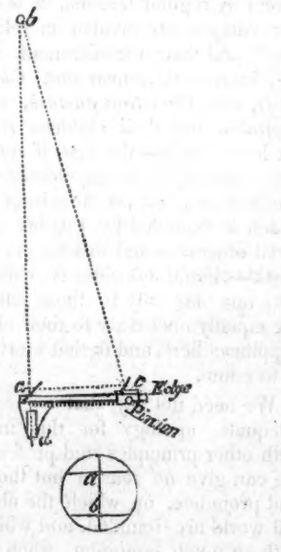
We think any man can put two horizontal wires in his telescope, and use them as

is detailed below, without fear of any one's patent right,

Several useful hints as to keeping record of levels, will be found at the end of the article. G. C. S.

"As the district occupied by the army of an enemy cannot be surveyed in the usual manner, excepting at imminent hazard to the officers engaged in the operation, the mode of doing so must be such as is employed for ascertaining inaccessible distances. Some of the most prominent objects of the country might very properly be laid down on the plan by triangles having large base lines; but it would be almost impossible to ascertain the position of objects of secondary consequence, not to speak of details, in this manner, as the angles would be so multitudinous and confusing, as to defeat the end that was intended. To supply a remedy for this defect, many scientific persons have proposed to measure the distances of these minor objects from a minute base. All the plans, however, that have as yet been proposed are attended with great difficulty and trouble to the surveyor, as the base being invariable in its length, the instruments are required to be very delicate in their construction, so as to be able to measure very small differences in the angles of the triangles, and even after all the result obtained cannot be depended upon as to correctness. Sir David Brewster's telescope with the divided object glass is certainly less objectionable than most methods; but still the measurement of the base, together with the two adjustments of his instrument at every series of operations for ascertaining a distance, must be the means of wasting a deal of time, which is so precious to the surveyor in the field. If, however, the angles adjacent to the base were made *immutable*, and the base itself were lengthened or shortened, according to the distance of the object to be measured, the operation would then become much more expeditious, and it would be as easy to compute two or three miles as so many hundred yards.

The simplest method for carrying this principle into effect, is to fix securely (see figure in next page) on a straight edge, *a c*, a mirror, *a*, the face of which describes an angle of 45° with *a c*, and through the centre of which a part is left transparent, resembling one of the glasses of a quadrant or sextant, so as to allow the object *c* to be seen by the observer, whose eye is supposed to be at *d*; *c* is another mirror, the face of which describes with the base *a c*, an angle less than 135°, which is secured upon a square sliding along the edge of *a c*, which of course must be made as straight as possible. The square *c* may be moved along the straight edge *a c* either by a rack and pinion or by a shifting screw; *d* is a telescope similar to that of a sextant, only larger, so as to make the object *b* more distinct; *a c* is graduated as before stated, and a nonius scale is fixed upon the sliding square *c*. After having directed the telescope upon the objecbt *b*, the square *c* is slid along *a c*, till *b* is reflected from the mirror *c* on that of *a*, and thence to the eye at *d*, causing the reflected object to coincide with the same as seen by the eye through the transparent part of the mirror *a*. The distance *a b* as indicated on *a c* is then read off, and either noted down in a field-book or pricked off immediately upon the plane table. If 1 foot along *a c* be made to represent 2000 feet along *a b*, then 1 foot of *a b* will be indicated by nearly the $\frac{1}{10\,0}$ part of an inch, which is very easily read off with the assistance of a nonius, much more so than the minutes of a degree on a common theodolite, where it is usual to measure with the nonius the $\frac{1}{1\,0\,0\,0}$ part of an inch An error, therefore, cannot easily be created in this operation; but a mistake is more likely to occur in an imperfect coincidence of the object with its image; the probability of which, however, would be greatly lessened through care and a little practice on the part of the observer. Some persons, however, may object to this instrument, on account of the great difficulty in constructing a perfect straight edge; but I have seen two made by Mr. Adie of Edinburgh, out of a common pit-saw, which, could not in any part have deviated the $\frac{1}{4\,0\,0\,0}$ part of an inch from a right line, as when they were applied to one another, the light was completely intercepted by them. What has therefore been accomplished in one instance may be expected in another. Where, therefore, good workmanship has been displayed in an instrument, an *accurate observer* need not expect an error of more than about a foot in a mile, by my method of measuring inaccessible distances. Should a surveyor wish to take in a circuit of more than a mile in radius from one station, instead of having a large base, he would probably find it more convenient to have several supernumerary slides in the case of his instrument, each of which might have their mirrors so adjusted, as by their means to be able to measure 2000, 4000, and 8000 feet or yards of distance in 1 foot of the base *a c*. In this manner the length of the instrument need not exceed much more than two feet and a half, and would therefore be of a size far from bulky or unmanageable.



An observation likewise might be taken by it quite as expeditiously as with a theodolite or sextant, so that far from its becoming an annoyance to a surveyor, in cases where very great accuracy in the plan of a country is not requisite, it might supersede the use of not only the theodolite, but the chain likewise.

To exemplify the truth of this, let *a* be the station where a surveyor has fixed his instrument, the support of which may be a plane-table; *b* is the object whose distance from *a* the observer wishes to ascertain. Let *b a c* be a right-angled triangle, of which the angles *b a c* (a right angle) and *b c a* are constant and invariable, whatever may be the distance of *a b*, *a b'*, *a b''*, &c. As the sides of similar triangles are proportional, *a c'* will be to *a b'* or *a c''* to *a b''*, &c., as *a c* is to *a b*. The observer has, therefore, merely to measure the base *a c* which may be graduated in the same manner as a plane scale, so as to give the exact length of *a b* in miles, yards, feet, or any other measure the surveyor may prefer. If therefore *a c* be 1 foot in length, and the angle *b c a* be previously so arranged by the mathematical instrument-maker, as to make the distance *a b* = 1 mile in length, 2 feet or twice *a c* will show that the distance *a b'* is exactly two miles, or if *a c''* were six inches in length, the quantity *a b''* would then be half a mile.

The celebrated James Watt proposed to measure distances, by means of a telescope fitted up with wires, as in the adjacent figure.

An assistant was to convey to any station, the principal desired, a staff graduated from a foot or so from the end resting on the ground, upwards into, say feet, tenths, &c. A vane with a horizontal line drawn upon it, which could be seen at a considerable distance through the telescope, was to be secured at zero on the staff, whilst another and a similar vane was required to slide along the staff at pleasure. The surveyor was to fix the nether wire *b* of his telescope upon the lower vane, whilst he directed the assistant by signals to raise or depress the moveable one, till it coincided with the upper wire *a*. The staff was then to be taken to him by his assistant, and the distance, as shown by the upper vane from the lower one, was to be noted down in the field-book as that between the two stations. The Edinburgh Philosophical Journal states that by this method Mr. Watt surveyed part of the line of the Caledonian canal previously to its formation. Much time would be saved by dispensing with the vanes, and having the graduation on the staff made sufficiently distinct, as to be legible through the telescope at a considerable distance, say 2000 feet. I have actually measured distances in this manner, which were wonderfully correct. But the great objection to Mr. Watt's method is the loss of time which occurs in waiting till the assistant has removed the staff from one station to another, as well as the great liability the surveyor undergoes of having his directions misunderstood. This principle, however, might very safely be employed, in measuring the distances between one station and another, in the operation of levelling, so as

to act as a check on the person who has the management of the chain, particularly when crossing a ravine, where the assistant is apt to become negligent in his measurements. The telescope of the level might be fitted up with additional hairs, so as to subtend, *if possible*, 2 feet of the staff in 100 feet of the distance. In that case, however, the surveyor would be under the obligation of fixing his instrument in the line of the levels, which would not otherwise be necessary.

As I have adverted to the subject of levelling, it may be as well to state, that I have found it very convenient to have one side of the staff graduated black on a white ground, and marked 1, 2, 3, &c., feet and tenths from the bottom; whilst on the reverse side the graduation is made with *red* paint on a white ground, but numbered 3, 4, 5, &c., beginning from a distance of *seven and a half tenths* of a foot from the end which rests on the ground. By the two sides of the staff, a very different number representing the height of the ground is obtained, that from the latter side being constantly 225 feet higher than what the other indicates. An error in the levels can thus by a single glance be detected, as the quantities read off being so wide of each other, the memory no longer acts disadvantageously in a repetition of the observation. Instead, therefore, of being obliged to recommence the levels from the outset, when a surveyor suspects an error to have taken place, he would merely proceed to that part where his observations did not correspond, and not only time would be saved by his adopting these checks to his work, but he would acquire such a confidence in it that nothing could destroy. HENRY E. SCOTT.

From the London Repertory of Patent Inventions.

OBSERVATIONS ON INSECTS PRODUCING SILK, AND ON THE POSSIBILITY OF REARING SILK CROPS IN ENGLAND. BY THE REV. F. W. HOPE, F. R. S., ETC.

Previously to entering on the subject of this paper, I will offer some statistical *details*, illustrative of the vast importance to the commercial prosperity of this great country, of the few insects producing silk. These details may stimulate the entomologist to pursue particular lines of inquiry; and may we not hope that the result of such researches will be the addition to our productive sources of various new species of these little laborers, to whom man owes so much?—species which might be available at our own doors, by the capacity of enduring our climate, and thriving on its vegetable productions, and in case it were necessary, by having recourse to artificial means for their culture? May we not suppose the manufacturer would find his hot-houses for silkworms as profitable a speculation, with extended demand, as the fruiterer does his hot-house for the supply of the comparatively limited demand for the luxurious desserts of the rich?

In the years 1832–3, respectively, the quantity of silk imported for home consumption was 4,392,073 lbs. and 4,758,453 lbs., being an increase of 3¼ per cent. in the latter year. The value of the exports for those years was 529,990*l.*, and 740,294*l.*, being an increase of 40 per cent. in one year. The average for ten years, from 1814 to 1823, and the succeeding ten years, exhibits a more striking and gratifying difference; the first period giving for annual home consumption 1,580,616 lbs., and the last ten years, 3,651,810 lbs., being an increase of 131 per cent.

On the authority of Mr. Winkworth, I state the number of persons employed in England in the silk trade in 1823 at 500,000; and at the present moment there are probably 700,000 engaged in it. Leaving these details for the present, let us now proceed to the examination of insects producing silk.

The chief insects which produce silk are ichneumons, spiders, and moths. My friend, Mr. Stephens, will this evening exhibit to your notice a specimen of ichneumon-silk; and as it is more likely to prove an object of curiosity than utility, I pass on to spider-silks.

Several genera of spiders produce silk of various strength and qualities, such as the gossamers, and our domestic species, to well as many others. In France, Monsieur Bon had gloves and stockings manufactured of it: sufficient experiments, however, have not yet been made as ascertain the quantity and quality of spider-silk.

If in Rome the whimsically extravagant emperor, Heliogabalus, collected 10,000 lbs. weight of spiders, as a vain display of power, surely in this metropolis we might collect a sufficient quantity of cobweb to perfect any experiments on a silk likely to be as strong as that obtained from *Bombyx Mori*, and probably less impervious to wet; a silk, however, not likely ever to be much in vogue, from the natural antipathy which prevails against spiders, from the difficulty and expense in collecting the web, and the impracticability in breeding spiders in any numbers, arising from their voracious and predatory habits: but the cocoons might be gathered and unwound. Abandoning our indigenous webs, such as float over the fields, as well as those which hang in dusky wreaths in garrets and in cellars, we may naturally expect to meet with exotic and tropical species which yield silk worth attention. It is probable that the cylindrical sacks of the gigantic *Mygale* may be advantageously collected, as the cocoons equal in size large walnuts, in one nidus of which 100 young ones have been discovered: it is reported, also, that some kinds of web are so strong that birds are entangled in the meshes, and that their webs oppose a certain degree of resistance even to man himself. In concluding my remarks on spider-silk, I would recommend that attention be directed to the silk obtained from *Epeira clavipes*, a spider abundant in Bermuda: fine specimens of its silken cocoon may be seen at the British Museum; and other species of the same genus also are deserving of attention.

MOTH SILK.

The principal moths producing silk belong to the genera *Clisiocampa Bombyx*, and *Tinea*. The *Bombyx Mori* (the proper type of the genus) yields it in great abundance: This species has become naturalized in the fairest portions of the globe.

As it appears from the statistical details, that silk is so intimately connected with our commercial and manufacturing interest, it is evidently worth while, for the prosperity of those interests, to recommend its increased cultivation; and really, if ever there was a period when its cultivation could be carried on with increased success, it is the present moment. Look at our Indian possessions in the full enjoyment of peace: the English, ruling these extensive territories, might induce the natives to grow (if I may use the term) any quantity of silk, sufficient to glut all the markets of Europe. In these regions there are generally eight successive silk crops; some authorities assert even more. Extending, moreover, our views to China, as the trade with that country is now thrown open to British capital, enterprise and industry, we may naturally expect that a stimulus may be applied there to its increased production. Abandoning, for the present, however, foreign produce, it remains to state the possibility of growing silk in England, and this part of my subject requires a thorough investigation. Prussia, Bavaria, and even Northern Russia, whose climates are not superior to our own, grow annually large quantities of silk; and why does not England do the same? the answer is, the price of labor is here too high; secondly, the experiments tried have already failed. Notwithstanding these assertions, I think that it is possible to grow silk in England, and grow it even with success and profit. To meet these objections, I would suggest, first, that we ought to breed silkworms in hot-houses throughout the year; and, secondly, that the Pavonia Moths of Europe and other countries, as well as the Atlas Moths of Asia, should be reared in like manner. It has already been remarked, that several "crops" are obtained in the East within the year; and why may we not also expect in England several, by means of breeding the worms in hot-houses? In India, the longest period for a generation of silk-worms appears to be forty days: even allowing fifty days in England for a generation, we may then expect seven crops of silk. If we only obtain four, that is double the number produced in Italy, where they annually rear but two. I need now scarcely add that four crops will no doubt repay the speculator for rearing silk. To reduce, however, his expenditure as much as possible, I would recommend him to feed the silkworms with lettuce instead of mulberry leaves; first, as there is less expense in the cultivation; secondly, as the lettuce can be grown cheaply in cucumber frames during the winter months; and, lastly, as the quality of silk does not depend so much on the *quality* of the *leaf*

as it does on the *degree* of temperature in which the worm is reared, I would strenuously recommend the lettuce. Should the food of the mulberry tree, however, be preferred to the lettuce, we can still adopt the discovery of Ludovico Bellarde, of Turin. His plan consisted in giving the worms the pulverized leaves of the mulberry trees slightly moistened with water: the leaves were gathered in the previous summer, dried in the sun, reduced to powder, and then stowed away in jars for the winter food, or till the tree was in full foliage. Repeated experiments made by Bellarde prove that the worm preferred this kind of food to any other, as they devour it with the greatest avidity. To reduce still further the expenditure, old men, women, and children, might be employed in feeding the worms, as is the case at present in India: indeed, might not the poor in the workhouses be rendered available, thus affording them amusement and profit?

With regard to rearing other silk-moths, I am well convinced that the *Pavonia minor* might be propagated to any extent in this country, as the larva are general feeders, probably the Laquey Moths might also be reared with success; the larger *Pavoniæ* of Europe and other countries, should also be tried. But a great object would be to import the eggs and breed the Atlas Moths in England, which have already yielded a fine silk, well worthy the attention of the manufacturer of Great Britain.

As there is not time at present to enter into the merits of the Tasseb, Arrindi, Bugby and Kilisurra silkworms of India, I merely mention the chief writers on this subject, viz. the celebrated James Anderson, Dr. Roxburgh, General Hardwicke, and Colonel Sykes; the two last, I am happy to say, are members of this Society, and I am sure will most willingly give all assistance in their power towards the attainment of so desirable an object as that of rearing silk in this country.*

In concluding these remarks, I would suggest the formation of a committee to investigate all that relates to silk. Let the silk manufacturer learn that the committee is disposed to give him all the assistance in its power, that it is equally desirous of his advice and observation; let the mechanic learn that we need his practical aid, on which he alone can give us useful assistance. A report, emanating from this Society, embodying in it the opinions of the manufacturer and entomologist, would do some good. If the object of producing silk in England fail altogether, we shall still have the merit of meaning well; should it succeed, however, thousands of our poorer countrymen will find employment and reap the benefit. —[Transactions of the Entomological Society of London, vol. i.]

* Should the first attempts fail, eventually there is every reason to believe that success must follow perseverance, as it has already done in other countries. Till that wished for period arrives, I would earnestly recommend not only the increased cultivation of silk in India, but in all our colonies, most particularly in New-Holland. At the Cape of Good Hope, at the Mauritius, at Malta, at the barren rocks of St. Helena, the silkworm has been introduced with partial success; and from those countries may we not in future calculate on some increasing produce?

CURIOUS DISCOVERY.—NOTICE OF A NEW MODE OF PRESERVING ANIMAL BODIES.—COMMUNICATED AT THE EDITOR'S REQUEST, BY MR. HENRY N. DAY.

The following account of an interesting discovery, recently made in Italy, is taken from a pamphlet published in Florence, during the last summer.

The author of the discovery, Sig. Girolamo Segato, is already favorably known to the scientific world, as the author and engraver of improved maps of Africa and Morocco. Ardent in the pursuit of science, he traversed the deserts of Northern Africa, and by his researches, corrected and considerably advanced the knowledge of those regions. It was while travelling in these parts, that he received the first hint of this great discovery. In the path of one of those interesting phenomena of the African deserts—a vortex of sand—which his curiosity prompted him to trace, he, one day, discovered a carbonized substance, that upon closer investigation proved to have been originally animal matter, and to have been carbonized by the scorching heat of the sand. He afterwards discovered an entire human carcass, partly black, partly of a sooty hue, about a third less than the ordinary size of man, and all perfectly carbonized. It occurred to him that this accidental process of nature might be imitated by art, to the perfect preservation of animal substances. To discover *how*, occupied now his whole attention. At the end of some months, devoted to this pursuit, the happy thought flashed upon his mind, which was to lead him to the discovery of the desired secret. Compelled to return to Italy, by a dangerous malady brought on by nearly a week's exposure to an unwholesome atmosphere, in a pyramid of Abu-Sir, which he had entered for the purpose of extending his scientific researches, he was obliged to intermit for a time his favorite pursuit; but after regaining his health, he again gave himself to it with renewed ardor; and after a short time succeeded, to the highest degree of his most sanguine expectations.

The following are some of the results obtained by the discovery.

Entire animal bodies yield as readily to the process, as small portions. They become hard, taking a consistency entirely stony. The skin, muscles, nerves, veins, blood, &c., all undergo this wonderful change; and to effect this, it is not necessary to remove any part of the viscera. The color, forms and general characters of the parts remain the same. Offensive substances lose their smell. Putrefaction is checked at once. What is most wonderful of all is, that if the process be carried only to a given degree, the joints remain perfectly flexible. Skeletons even remain united by their own natural ligaments, which become solid, although they retain their pliancy. Moisture and insects never injure them. Their volume diminishes a little; the weight remains almost the same. Hair continues firm in its place, and retains its natural appearance. Birds and fishes lose neither their feathers, membranes, scales, nor colors. The insect preserves its minutest appendage. The eyes in most animals, sparkle as in life, and from their want of motion alone would you suppose vitality extinct.

The following are some of the objects, that have been subjected to the petrifying process, and are now exhibited in the studio of Sig. Segato. One of the first of his experiments, was performed upon a Canary bird, (Fringilla Canaria, Lin.) It is still preserved unaltered, although it is now ten years since the experiment was performed; and it has been submitted to the action of water and of insects. A parrot (Psittacus aestivus, Lin.) retains its original brilliancy of plumage, unimpaired. Eggs of the land turtle, turtles, various tarantulae, a water snake, a toad, various kinds of fish, snails and insects, are in a perfect state of preservation. To these, are added various parts of the human body. A hand of a lady, who died of consumption, preserves the emaciation of the disease and of death. Another of a man is flexible in the different phalangic articulations, and yet unalterable; a foot with the nails prefectly fast, a collection of all the intestines of a child, in their natural colors and forms, with the fecal matters unremoved; the liver of a man who died from intemperance, dark and lustrous like ebony; an entire human brain with its convolutions, of extreme hardness; the skin of a woman's breast, naturally configured; a pate of a girl perfectly flexible, from which the hair hangs in curls; the head of an infant partly destroyed, and discolored by putrefaction. There is also in the cabinet of Sig. Segato, a table constructed as follows. A spheroïdal surface of wood contains a parallelogram, composed of two hundred and fourteen pieces, regularly arranged. These to the eye appear like the most beautiful pietre dure that have been produced by nature. Their various colors, polish and splendor, and their surprising hardness would leave no doubt of their stony character. The sharpest file, with difficulty, makes an impression on any of them; some it does not attack at all. These pieces are all portions of the human body, hardened by this new process; as the heart, liver, pancreas, spleen, tongue, brain, arteries, &c., &c., all resembling the most highly polished precious marbles. An entire body has not yet been tried, principally on account of the limited resources of Sig. Segato, although the expense would be but about one tenth of that of embalming by the ordinary process.

Great advantages to science, especially to natural history and human anatomy, are expected to result from this discovery; and it is even confidently believed that the remains of friends, of men of science and of worth, may be preserved for ages in the exact form and appearance, in which the hand of death found them, with nothing offensive or revolting about them.

As vouchers for the accuracy of the statements contained in the pamphlet, the

certificates of many of the distinguished physicians, professors and men of science in Florence, where Sig. Segato resides, are appended. Among them, it is sufficient to mention the names of Sig. Betti, Professor of Physiology; Sig. Zannetti, Professor of Human Anatomy; and Dr. Gazzeri, Professor of Chemistry.—[Am. Jour. Science and Arts.]

From the London Repertory of Patent Inventions.

OBSERVATIONS ON THE RAVAGES OF LIMNORIA TEREBRANS, WITH SUGGESTIONS FOR A PREVENTIVE AGAINST THE SAME. BY THE REV. F. W. HOPE, F. R. S., ETC.

In laying before the Society some specimens of wood perforated by *Limnoria terebrans* (a crustaceous animal allied to the marine *Oniscidæ*, or sea wood-lice), my chief object is to elicit any observations which may tend to counteract its ravages.

A very able paper, by Dr. Coldstream, appeared in April last, in Professor Jameson's Journal, wherein its history, habits, and anatomical details are sketched with an accuracy which does honor to this useful pupil of Leach. It lives on the wood, which it perforates, and, as far as I have observed, so also does *Ligia oceanica*, and probably others of the *Oniscidæ*, marine as well as terrestrial. This fact, however, I believe, was first made known to us by Dr. Coldstream, who states that the contents of the stomach resemble comminuted wood. From finding the common wood-louse in outhouses, and *in and about* decaying timber, it appears to me not improbable that they also may partly feed on wood.

I hope I may here be allowed to express a wish that some of the members present will examine the contents of the stomach of the common wood-louse under a powerful microscope, and give us at some of our meetings the result of his investigation.

As the generic characters of *Limnoria* are well laid down, and as the animal is figured in the above quoted journal, I pass on to the objects of its attacks, and also to the remedies which have been applied to counteract its effects.

Fir, birch, and oak were nearly all attacked by it. Teakwood alone remained unperforated; probably, therefore, other *ironwoods* may be employed with like success. Among the experiments made to resist this evil, the following were the most important:

1st. Covering the piles with broad-headed nails, called scupper nails, the oxidation of which impregnating the wood yields a taste disliked by the animal. This plan, for a time, succeeds: the rapid consumption of iron, from the action of salt water, at length rusts off the broad heads, and it is necessary continually to replace them. Some have used copper sheeting with partial success; others have used common tar, with which they daub the piles before they bury them in the sea; but in a short time, from abrasion, the piles are robbed of this coating, and become perforated by the *Limnoria*.

There is an announcement in the public journals, that Mr. Stevenson has discovered a varnish capable of protecting wood from the attacks of this destructive pest. What this varnish may be, I am at a loss to conjecture; I only hope that Mr Stevenson will shortly make his discovery known, and as publicly as possible, as he may be the means of saving the wood-work of our flood gates, timber bridges, chain piers, and docks from inevitable destruction.

At the chain pier at Southend, in Essex, the piles are daubed over with gas-tar; and from inquiries made on the spot from the workmen employed, I found that there exists a general belief that where common tar fails, gas tar succeeds, the insects, as the workmen assert, not liking its taste.

Both the varnish of Mr. Stevenson and the gas-tar may succeed for a time; abrasion, however, will at length remove them: would it not, therefore, be possible, by means of perforated iron pipes running through the centre of the piles, occasionally to supply liquidated tar, and so keep up this gaseous influence? The expense of the pipes would probably be too great. It is ascertained that the *Limnoriæ* attack neither the bottoms of ships nor fresh-tarred piles newly placed in the sea, partly, perhaps, as it requires time for abrasion to take place, and partly as the effect of the tar is not neutralized by salt water. Tar appears to be an antidote: gas-tar may be more efficacious; and as the oxidation of iron is effective for a certain period, probably by uniting two or more of these, we may preserve the piles for a longer period than has hitherto been done. In the sea I would form a bed of gas-lime, next add a thick stratum of gas-tar, and then drive the piles into it, coating them well over with gas-tar before-hand; by these means some good might be effected. By nailing also to the piles portions of honeycombed wrought-iron gas pipes (which might be purchased, I imagine, for a mere trifle) the gaseous taste might be kept up. Another remedy might be tried by saturating the piles with strong solutions of corrosive sublimate: moreover, should the spirit of caoutchouc (or India-rubber) be found eventually to be disliked by the *Limnoræ*, we shall then have a cheap and easy remedy.

So long as wood is used in the bedding of our marble public works, so long the annual loss must be great. As in 5 or 6 years the wooden piles become perforated and nearly useless, might it not be possible, by means of cast-iron hollow pipes filled with cement, and coated with a varnish externally, to make them last for 20 or 30 years? As this is a mere matter of calculation as to expense, I do not wish to enter upon it; any observations which may tend to keep the wood sound for a long period, is the present object of inquiry.

In concluding these observations, I have only now to add, that I think an inquiry on the subject of antidotes against the *Limnoria* is well worthy the attention of this Society: and I assure myself that the majority of its members unite with me, when I express a wish that as a body we may be equally distinguished for practical usefulness, as for entomological science. In short, if we can save the wood-work of chain-piers and docks from the destruction of the *Limnoria*, and diminish the ruinous expenditure they entail upon us, the Society will establish no small claim to the gratitude of the public.

Various suggestions were made by different members present at the reading of the preceding paper, for the institution of experiments to prevent the attacks of the *Limnoria*; and it was proposed by Mr. Yarrell (notwithstanding the statement made by Mr. Children, that insects immersed in a solution of corrosive sublimate will revive, after remaining immersed therein for at least twenty minutes), that the saturation of piles, &c., in such solution might, by the formation of a new compound formed by the action of the corrosive sublimate upon the wood, have the effect of preventing the attacks of insects, as well as the not less injurious attacks of the dry-rot and other vegetable causes of decay.—[Trans. Entomol. Society, vol. 1.] A. T.

Steam-Plough.—At a meeting of the Grantham Agricultural Association, Mr. Hanley stated that he had seen a steam-plough at work in Lancashire, which did its work remarkably well, and turned up an acre of wet land, at a depth of nine inches, in 1 hour and 50 minutes.—[London Mechanics' Mag.]

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* Phil. Trans., vol. cxiv., for 1824; [or, Phil. Mag., first series, vol. lxiv., p. 30, 233; vol. lxv., p. 203.—Edit.]

† [The negative results thus obtained by Mr. E. Davy, agree exactly with those of some trials which I have witnessed for protecting steel by this means.—F. W. H.]

From Florida there is nothing of interest by the Steamboat, although we have Charleston papers of last Saturday afternoon. Some extracts are annexed:

St. Augustine, April 12.

From the Army.—An express arrived last night from Picolata, bringing intelligence of Gen. Eustis. He was encamped two miles west of Pilaklikaha on the 4th inst. An express from him arrived at Fort King, requesting information of Gen. Scott. Two or three Indians had been killed on their route. Their corn had become exhausted, and the guide was unacquainted with the country beyond Pilaklikaha. The army was in good health. Pilaklikaha is 75 miles south west of Volusia.

Capt. McLemore, with 75 men, and two flat boats laden with provisions, left Suwannee Old Town, west coast of Florida, April 9th, for the mouth of the Suwannee river, to proceed thence through Vacassassa Bay to the mouth of the Withlacoochee, and up that river to the battle ground, to join Gen. Scott.

[*From the St. Augustine Herald 8th inst.*]

We learn from a gentleman from the Suwannee Old Town, that it was reported in Alachua, that Major Reed, with 250 men from Tampa came upon the main body of Indians, as he supposed, on the Withlacoochee in the night, and surprised them.—He opened a sharp fire, and killed 30 of them, and wounded a great many. They fled precipitately. This report was generally credited there.

It was also reported that Col. Lindsay from Tampa Bay, had joined Gen. Scott somewhere at or near the Withlacoochee.

We learn by a letter received in this city from the St. John's, that a report prevailed at Mandarin last week, that an Indian trail of a considerable body of Indians had been recently observed, on the river opposite Picolata, supposed to be that of a party reconnoitring for the purpose of attacking any escort from Picolata of supplies for the forts in the interior.

[*From the New Orleans Advertiser, April 13.*]

Texas.—The gentleman from whom we have the following statement, (Capt. Horton,) and who left Goliad on the 19th ult., informs us that Colonel Fannin having taken up his line of march on that day, at the head of 306 men, was attacked by the Mexican army consisting of from 1500 to 2000, about nine miles from Goliad. Our informant commanded the advanced guard, consisting of only 25 men, which was cut off from the main army; they remained in view of the battle for about three-fourths of an hour, and in hearing of it about two hours. During the time they were in view the Mexican cavalry made two unsuccessful charges on Fannin's army: the Mexicans, he thinks, must have lost half their number in these charges.

The attack was made about 5 o'clock in the evening, and continued about two hours and a half.—He is unable to state particularly how the battle terminated; he encamped within six miles of the battle field that night and heard the firing of cannon next morning. Having remained ten days within about ninety miles of the place where the battle was fought, he was unable during the time to get any correct account of its result. Capt. H. had two skirmishes with the Mexicans, about 250 in number, the day previous to the attack on Col. Fannin. They could observe three of the Mexican horses going off unmounted. Capt. H's. force, in these skirmishes, consisted of about one to five.

He also informs us that Col. Ward was despatched on the 9th ult. with a mission, (only 99 men) about 30 miles from Goliad, to the relief of Capt. King, who had been taken prisoner by the Mexicans with 23 of his men (six being killed.) An engagement took place on the 11th. Col. W. was attacked within 23 miles of the mission by 1200 Mexicans; he retreated into the mission without the loss of a man; 62 of the Mexicans fell. He fought them from half past four P. M. till 9 of the same evening. Ward then retreated toward Copano. The latest accounts from him stated he was making his way into the settlements, between the San Antonio and Guadaloupe rivers, towards Copano. On the same night in the town of Waloope, three of our citizens were murdered by the Mexican citizens. Dr. Harrison, (son of Gen. W. H. Harrison of Ohio,) was among the number of these unfortunate victims.

Mobile, *April* 14.—We have been favored with the perusal of a letter from Col. Samuel M. Williams, who recently left our city for Texas, which states that he had received a letter from Brazoria of the 1st April, which informed him of the retreat of Gen. Houston to the east side of the Brazos, it seems against the advice of his officers.

The Mobile Chronicle of the 16th inst. says:—On further conversation with some of the passengers by the Tensaw, we learn that the army of Gen. Houston was believed to be nearly equal in number to the Mexican force,—and was preparing for a general engagement. Reinforcements were expected, and daily arriving. 300 men under Col. Hustin, from Natchez, were on their way, and 1400 to 1500 from Kentucky and Tennessee, besides smaller parties from other places.

Fire at Alexandria.—On Monday night, a little after ten o'clock, a fire broke out in the second story of the large and extensive Cabinet Manufactory, at the corner of Prince and Fairfax streets, owned by Mr. James Green. The combustible nature of the materials within the building caused the fire to spread with great rapidity, and in a short time the Furniture Room and the whole of the Manufactory were enveloped in flames. The building was a large three story edifice, expressly fitted up for the business carried on in it, with a Steam Engine and new machinery. Its owner, after the misfortune of the great fire, in 1827, by which he lost all his property, had labored diligently to raise up this establishment, and, after years of labor and great expense, he at last succeeded. A night of disaster has defeated his exertions! There was not more than three thousand dollars insured on the property, and the loss sustained cannot be less than *twenty thousand dollars!*

The dwelling house and tailor's shop, owned and occupied by Mr. Robert Massey, on Prince street, next to the Manufactory, were entirely consumed; the three story brick dwelling adjoining the Manufactory, on Fairfax street, was partially consumed; and Mr. John Wood's dwelling house, and the house occupied by Mr. Z. Nicholas on Fairfax street, were much injured.

At one o'clock during the night it was feared that a considerable portion of the town would be destroyed. As many as ten or twelve houses were actually on fire at different times, and but for the vigilant watch kept, and the constant wetting of the roofs, there is no knowing what might have ensued.

The light of the burning buildings was seen in Washington, and many of the citizens of that place, with their engines, went down to the relief of their brethren in Alexandria.—[Nat. Intel.]

Robbery of the Pearl.—Extract from the protest of Capt. Blackmer, of brig Pearl, of Boston, made before the U. S. Consul at Villa da Praya, January 23.

"I sailed from Boston, Sept. 28, and on Oct. 27, lat 32, long 23 30, discovered a herm-brig to windward. She bore down under Spanish colors: was boarded by her first officer as supposed, who desired a few provisions; was furnished with all he required, when he returned to his vessel for the pay, but instead of coming back he hoisted in his boat, and soon after hailed in Spanish, saying if I wanted pay I must send for it, and bring a seven inch rope; informed him that we had not the article on board. He then ordered our main yard hove aback, and our boat hoisted out and sent alongside, or he would fire into us, at the same time tricing up his ports and loading his guns, accompanied with threats that he would sink me unless despatch was made. This being done, the men were ordered back for all the rigging on board; and this being fulfilled, they were ordered back again to bring all the leather, duck, canvas, chronometer, &c. and a hawser and stream anchor; and a third time demanded dry goods, the best on board, threatening to board with his crew, cut the throats of us all, take what they pleased and destroy the vessel, unless the articles specified were sent with all possible despatch.—There being no remedy for the salvation of the lives and property, goods were sent until the pirate said he was satisfied. He then gave us permission to depart, filled away himself, and fired a gun."

A list of the articles taken from the Pearl, has been received. The amount of loss in goods is estimated at between 4 and $5000. They consisted principally of American manufactured cotton goods (13 cases, 4 bales) and some foreign goods. No account is received of the description of the vessel, her force, destination, or whence she came.

At a time when the attention of the observers of nature is more than usually called to meteoric phenomena, the following account of an observation of shooting stars, made by Sir John Herschel, at the Cape of Good Hope, last November, is not without interest. It is taken from the London Atheneum of February 27th.—[Eve. Post.]

Annual Meteoric Phenomenon.—Our Transatlantic brethren have, for the last two or three years, indulged us with accounts of some most extraordinary meteoric appearances that have taken place in America about the middle of the month of November in each year, and generally on the same day. The phenomenon in question consists of a most brilliant display in the heavens of a great quantity of that class of meteors called *shooting stars*, which, during the whole of the night above alluded to, keep up a constant discharge, and illuminate the whole hemisphere. The most remarkable circumstance, however, attending this affair is, that the phenomenon always occurs on or about the same day of the month, (namely, the 14th,) and that the direction of the meteors is generally the same, which has induced many persons to imagine that it is connected with some extraneous body revolving round our globe. Mr. Baily, in the course of his correspondence with Sir John Herschel, noticed these remarkable statements, and requested Sir John to record any extraordinary appearance of this kind that might occur, during his residence at the Cape of Good Hope. The following is an extract of a letter which Mr. Bailey has just received from that distinguished philosopher:—"In all my sweeps in November I was on the look out for shooting stars, viz. on the 10th, 11th, 13th, 14th and 18th. On the 13th, and especially on the day mentioned in your letter, I told Stone (my assistant) to keep a sharp look out for them; his attention being disengaged whilst I was occupied at the telescope. He saw none. On the 14th, I still desired him to keep watch for them. The sweep commenced at 0h. sidereal time, and we went on till 4h. 8m. without his or my noticing any. At 4h. 8m. 19s. sidereal time, he called out, 'There goes the largest I ever saw.' It fell in azimuth north about half west perpendicularly. At 4h. 42m. 59s. he cried out again for another great one: this fell north, about two points east, not quite vertically, but rather inclining eastward. This was as large, he said, as Jupiter. At 4h. 46m. 39s. another great one falling east of Jupiter, and still more obliquely, elicited another call. At 4h. 53m. 59s. I absolutely started from the eye piece of the telescope, at the glare of a superb one, which fell about 20 deg. azimuth west of south, and obliquely. Stone thought that it lightened, though his back was to it, and it was hid from him by trees. It left a narrow, vivid and distinctly crooked train, which lasted 20 minutes, and admitted of being steadily contemplated. This meteor was equal to Venus, at her brightest *here*; and I ought to mention that Venus *here* casts a strong shadow, in which all the most minute parts of objects, as the leaves of trees, &c., are perfectly well distinguished, not only against the white wall of a house, but on the ground. You may be sure that I shall look out again next 13th and 14th of November, should I still be here; though I can hardly suppose the thing to be more than an accidental coincidence; however, I have seen no considerable meteor since."
